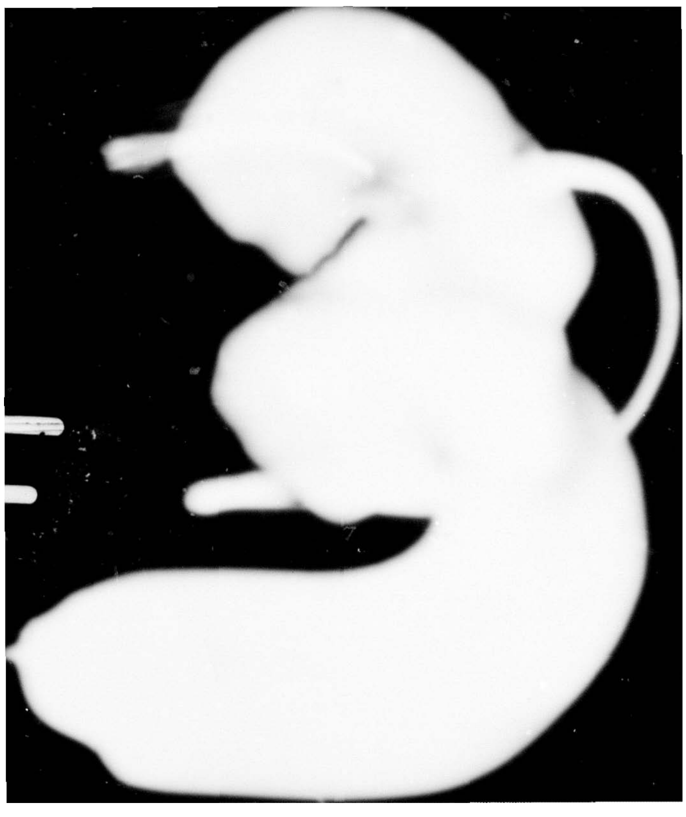
AD-A062 365 KAMAN AVIDYNE BURLINGTON MASS F/G 19/4
MEASUREMENTS OF BLAST PRESSURES ON A RIGID 65 DEGREE SWEPTBACK --ETC(U)
JUN 77 J R RUETENIK, R F SMILEY DNA001-76-C-0106
UNCLASSIFIED KA-TR-137-VOL-2 DNA-4400F-2 NL

1 OF 3
AD
A062365



AD-E300 185

(12) LEVEL III

DNA 4400F-2

A053 468

MEASUREMENTS OF BLAST PRESSURES ON A RIGID 65° SWEPTBACK WING AT MACH 0.76 FROM ROCKET PROPELLED SLED TESTS

Volume II—Supplementary Data

Kaman AviDyne
83 Second Avenue
Burlington, Massachusetts 01803

20 June 1977

Final Report for Period October 1975—May 1977

CONTRACT No. DNA 001-76-C-0106

APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED.

THIS WORK SPONSORED BY THE DEFENSE NUCLEAR AGENCY UNDER RDT&E RMSS CODE B342077464 N99QAXAE50101 H2590D.

Prepared for
Director
DEFENSE NUCLEAR AGENCY
Washington, D. C. 20305

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

(19)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: DNA 4400F-2 AD-E300 185	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER (9)	
4. TITLE (and Subtitle) (6) MEASUREMENTS OF BLAST PRESSURES ON A RIGID 65° Deg. SWEPTBACK WING AT MACH 0.76 FROM ROCKET PROPELLED SLED TESTS. Volume II. Supplementary Data.	5. TYPE OF REPORT & PERIOD COVERED: Final Report for Period October 1975 - May 1977
	6. PERFORMING ORG. REPORT NUMBER: KA-TR-137-Volume II VOL-2
7. AUTHOR(s) (10) J. Ray Ruetenik, Robert F. Smiley	8. CONTRACT OR GRANT NUMBER(s) (14) (15) DNA 001-76-C-0106
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Kaman AviDyne, 83 Second Avenue, Burlington, Massachusetts 01803 — 194 970	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS (16) NWED Subtask N99QAXAE501-01
11. CONTROLLING OFFICE NAME AND ADDRESS: Director, Defense Nuclear Agency, Washington, D.C. 20305	12. REPORT DATE (11) 20 June 1977 (17) E501
	13. NUMBER OF PAGES: 228
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) (12) 228p.	15. SECURITY CLASS (of this report): UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

(18) DNA, SBIE

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

This work sponsored by the Defense Nuclear Agency under RDT&E RMSS Code B342077464 N99QAXAE50101 H2590D.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Blast	Pressure	Aircraft	Sweptback
Shock	Experimental Test	Wing	Subsonic
Sled Test	Explosives	Vortex	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Interaction of a blast wave with a highly sweptback wing model was measured in a series of three sled tests performed on the 50,788-foot track at Holloman Air Force Base in July and August of 1976.

The sled, traveling at Mach 0.76, was intercepted progressively by blast waves produced from the sequential detonation of three charges of TNT. (over)

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

194 970

627044

LB

20. ABSTRACT (Continued)

The model consisted of a sting-mounted wing and fuselage combination. Wing properties were: 46.80-in. span, 18.95-in. mean chord, 2.47 aspect ratio, 0.29 taper ratio, 67 deg. leading edge sweepback, 64.8 deg. quarter-chord sweepback, and a 64A012 wing section. Blast induced loadings were measured at 20 locations on the wing for blast intercept overpressures of about 2 and 4 psi for blast intercept angles of about 20, 90, and 135 degrees from head-on.

A preliminary analysis of the test data indicates the existence of some nonlinear blast-induced loads on the model appreciably greater than would be expected on the basis of linearized aerodynamic theory.

Volume 1 of this report describes the tests, and presents and discusses the reduced test data. Volume 2 presents a complete set of the wing pressure time histories in working size plots.

INTRODUCTION

This volume presents large size supplementary plots of the wing pressure transducer test data obtained during the sled tests described in Volume 1 of this report, most of which data are presented in greatly reduced size for one time scale in the first parts of Figures 17, 21, 25, 29 and 33 of Volume 1. These data consist of plots of time histories of pressures on the test wing for the various test conditions described in Volume 1. These pressure time histories are generally presented for two time-scales. An index of these figures is given as Table 1. Reference should be made to Volume 1, particularly Sections 2 to 4, for a detailed explanation and identification of all test conditions, transducer locations, and data interpretation. However, for the convenience of users of this volume, Figure 1 and Table 2 are repeated here from Volume I to indicate the locations of all transducers in the wing model. Table 2 also indicates the types of measurements made at each location.

TABLE I

INDEX OF TEST DATA

Run	Intercept No.	Figure No.
9B-A1	2	2
9B-A2	1	3
9B-A2	2	4
9B-A2	3	5
9B-A3	1	6

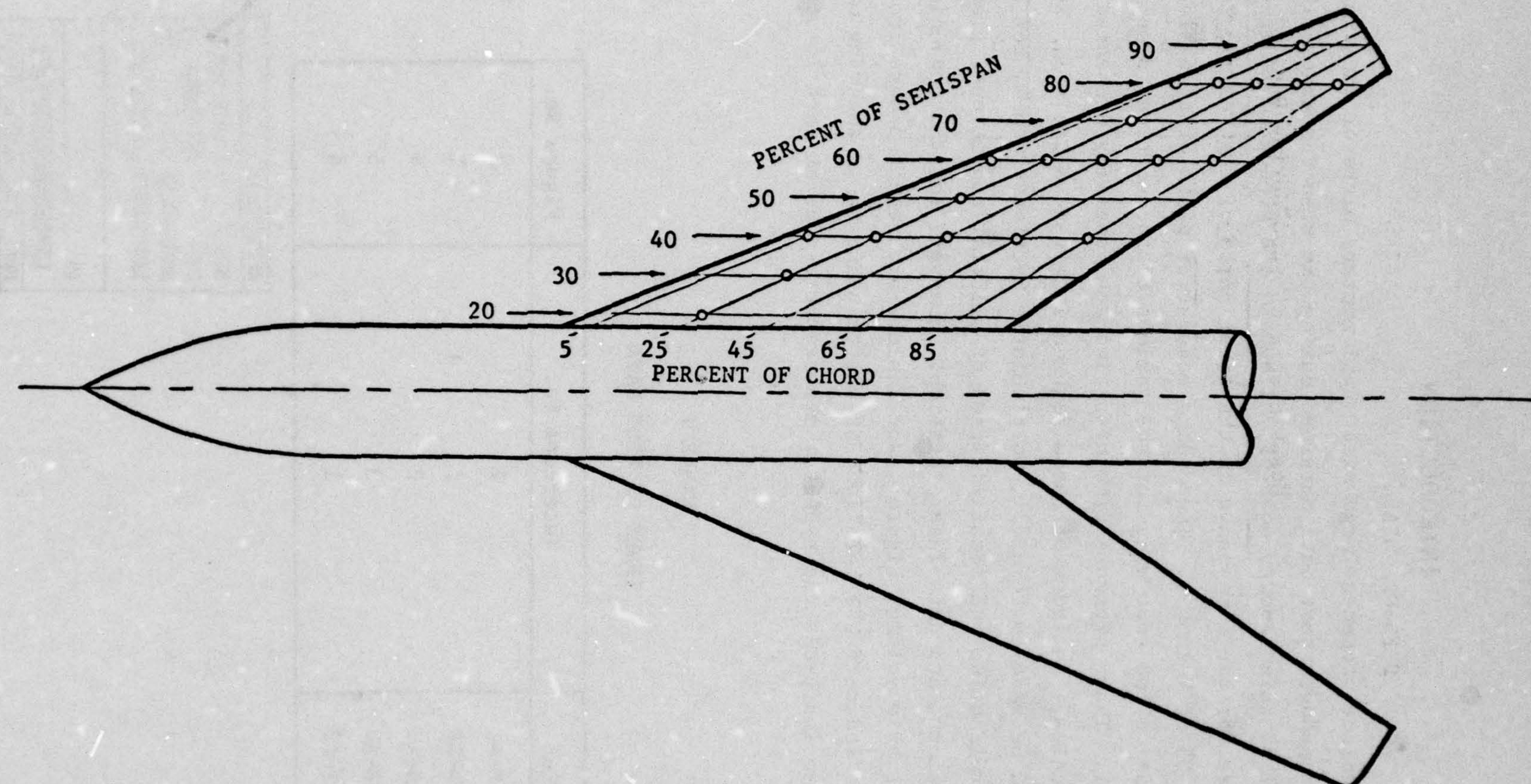


Figure 1. Sketch of Wing and Fuselage Model Showing Pressure Measurement Stations

TABLE 2

PRESSURE MEASUREMENTS ON THE WING

Transducer location, %semispan/%chord (Fig. 1)	Measurement recorded[a] during Run:		
	9B-A1	9B-A2	9B-A3
20/25	D,B,L	L	D
30/25	D	D,B,L	D,B,L
40/05	D	D	D
40/25	D	D	D
40/45	D	D	D
40/65	D	D	D
40/85	D	D	D
50/25	D	D	B[b,e]
60/05	D	D	D
60/25	D	D?[b,d]	D
60/45	D	D	D
60/65	D	D	D
60/85	D	D	D
70/25	D	D	D
80/05	D	D	D
80/25	D	D	D
80/45	D	D	D
80/65	D	D	D
80/85	D?[b,c]	D	D
90/25	D?[b,c]	L	D

[a]D for differential pressure, B for blastward pressure, L for leeward pressure.

[b]Transducer set up to measure differential pressure, but would indicate blastward pressure only if leeward transducer fails, or vice versa.

[c]Blastward transducer inoperative after run completion; operative during pre-run calibration.

[d]Leeward transducer inoperative after run completion; operative during pre-run calibration.

[e]Leeward transducer inoperative just before sled run.

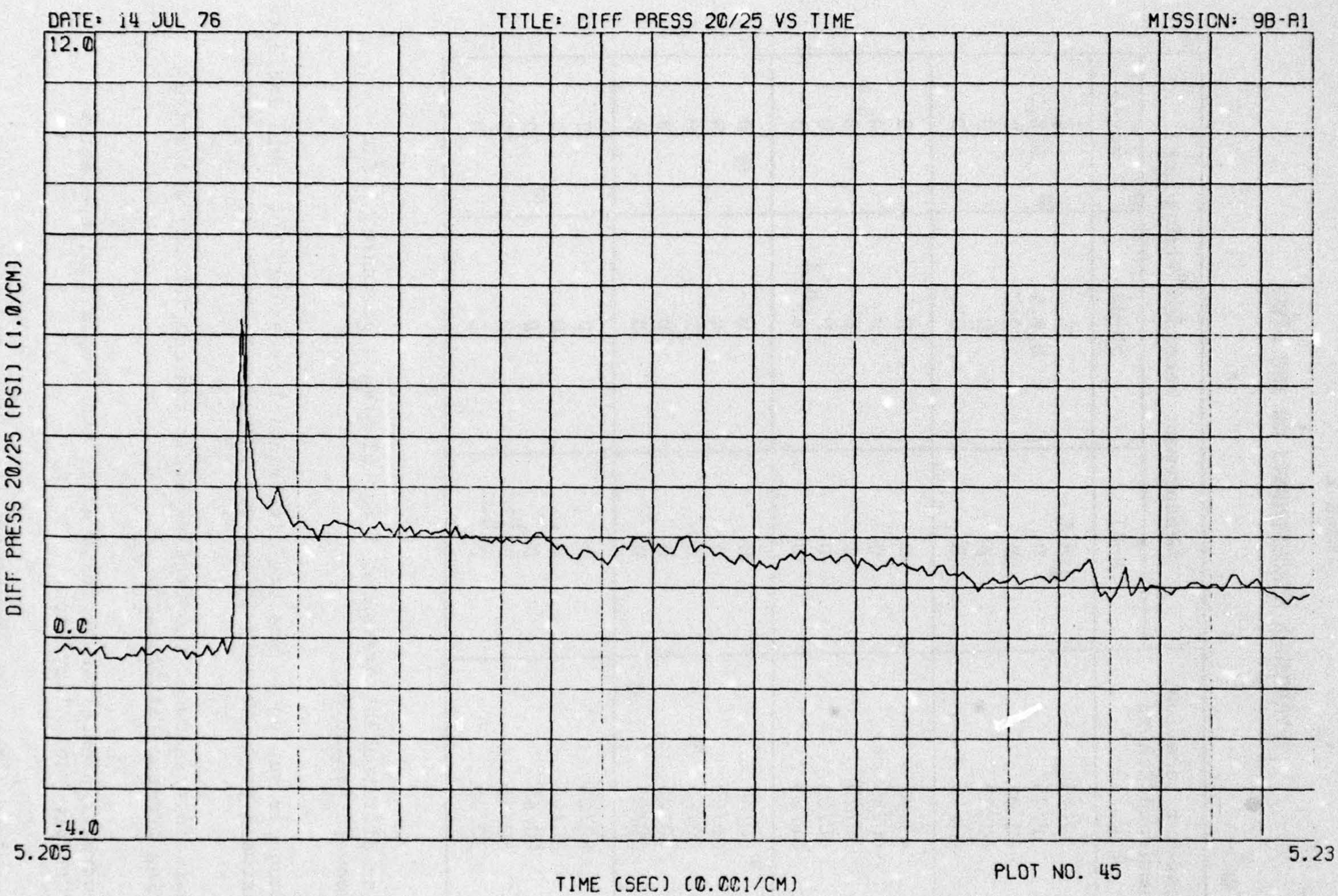


Figure 2. Wing Pressures, Run 9B-A1, Intercept 2, ϕ = 87.6 deg., Δp_s = 2.1 psi.

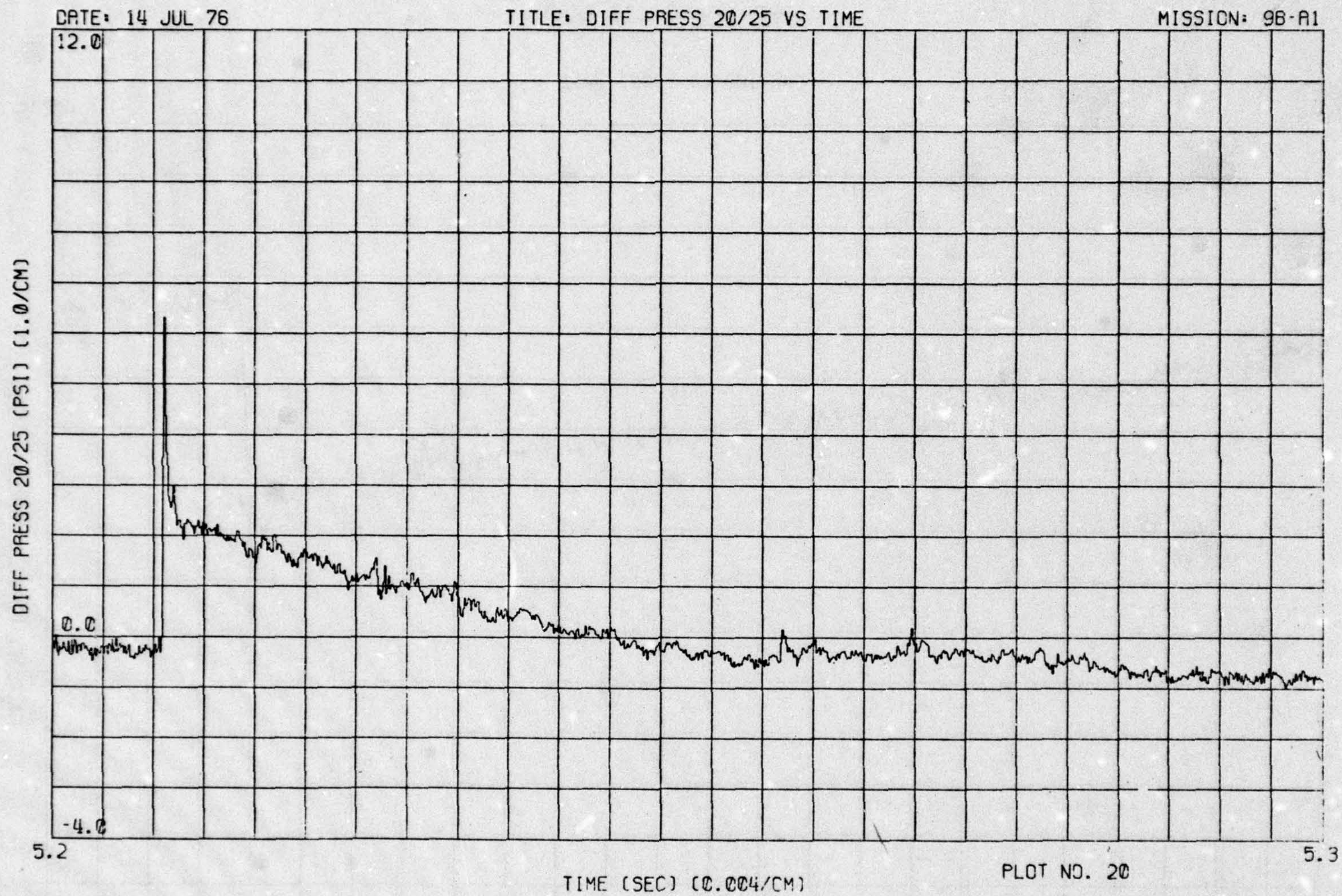


Figure 2. (Continued)

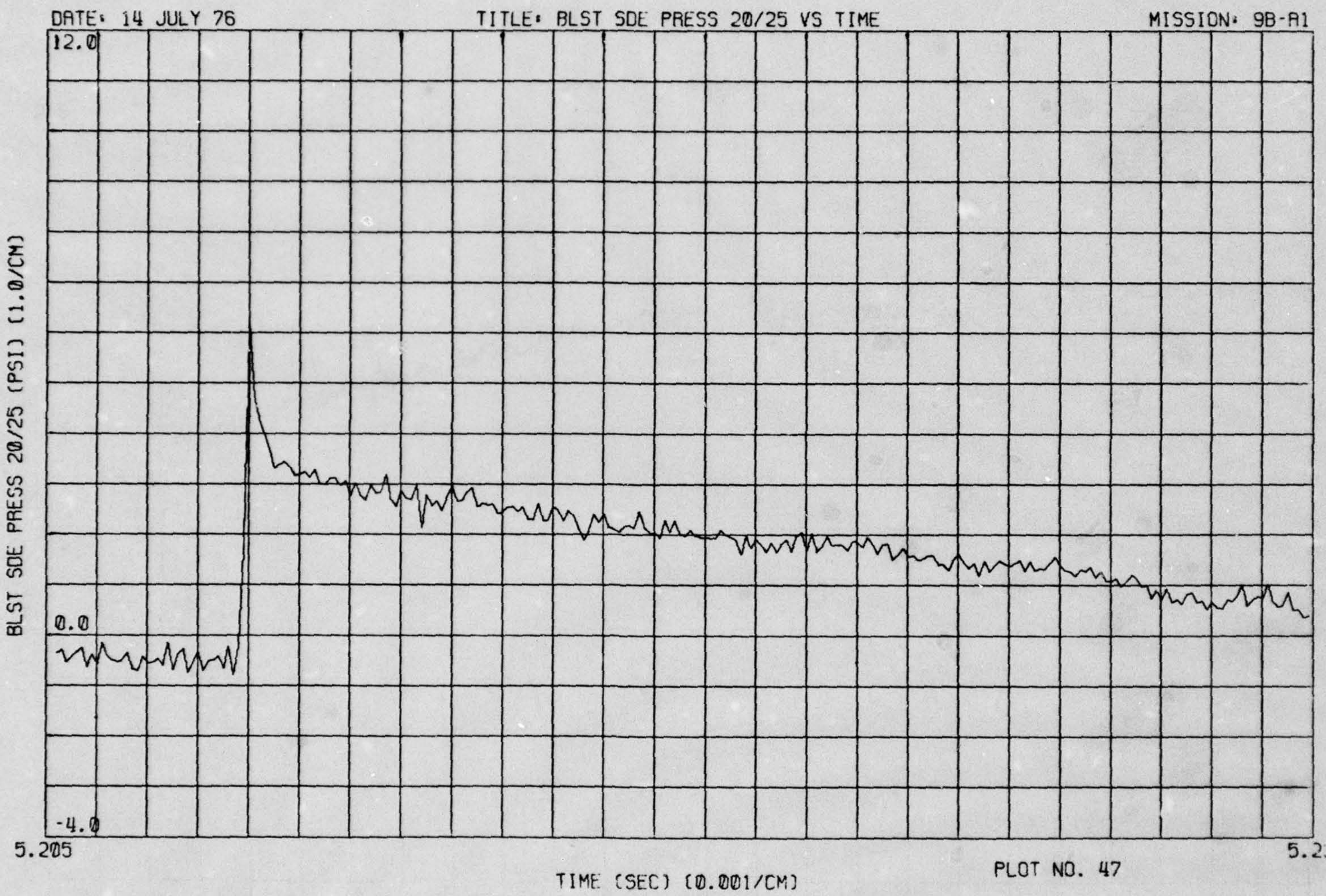


Figure 2. (Continued)

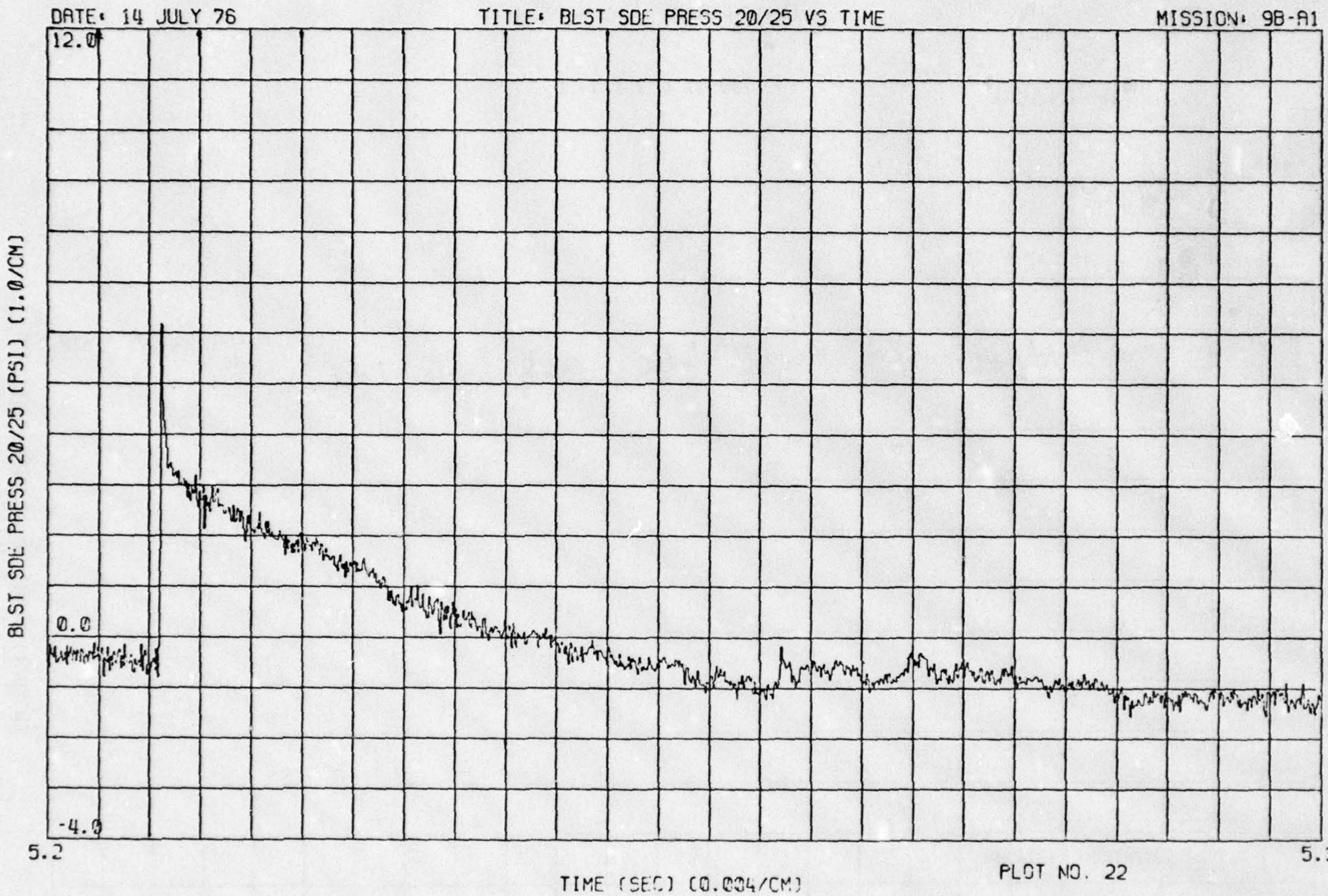


Figure 2. (Continued)

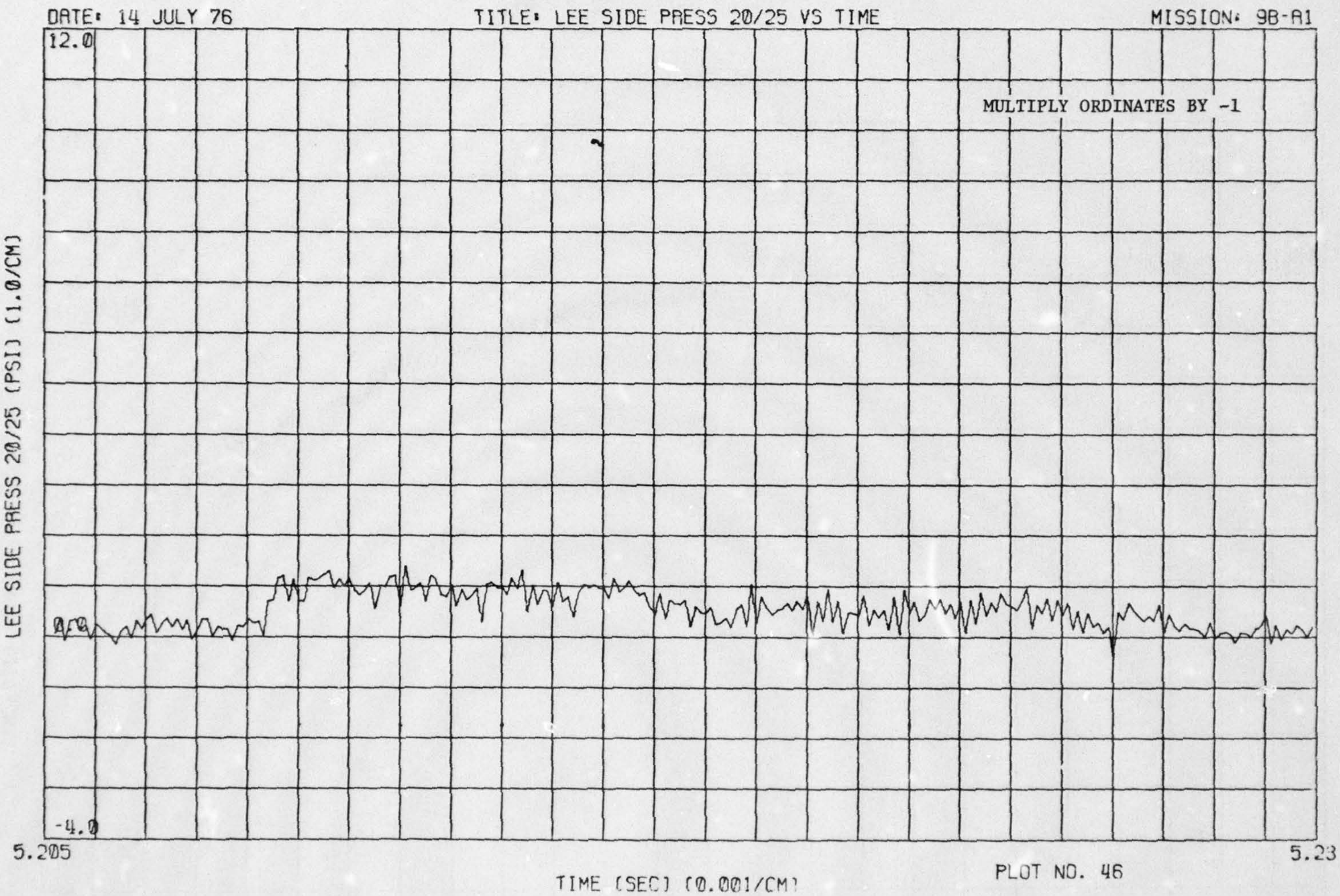


Figure 2. (Continued)

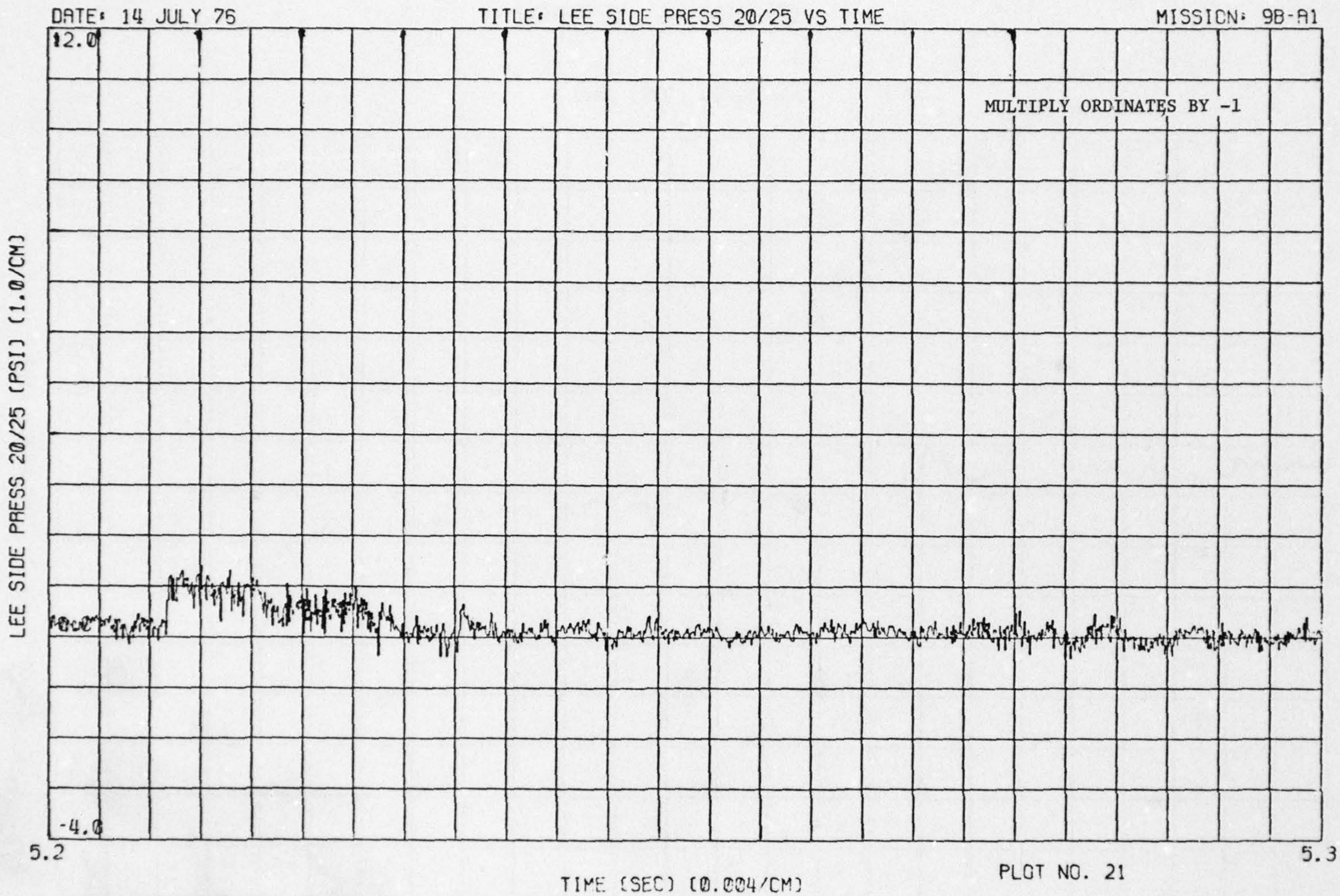


Figure 2. (Continued)

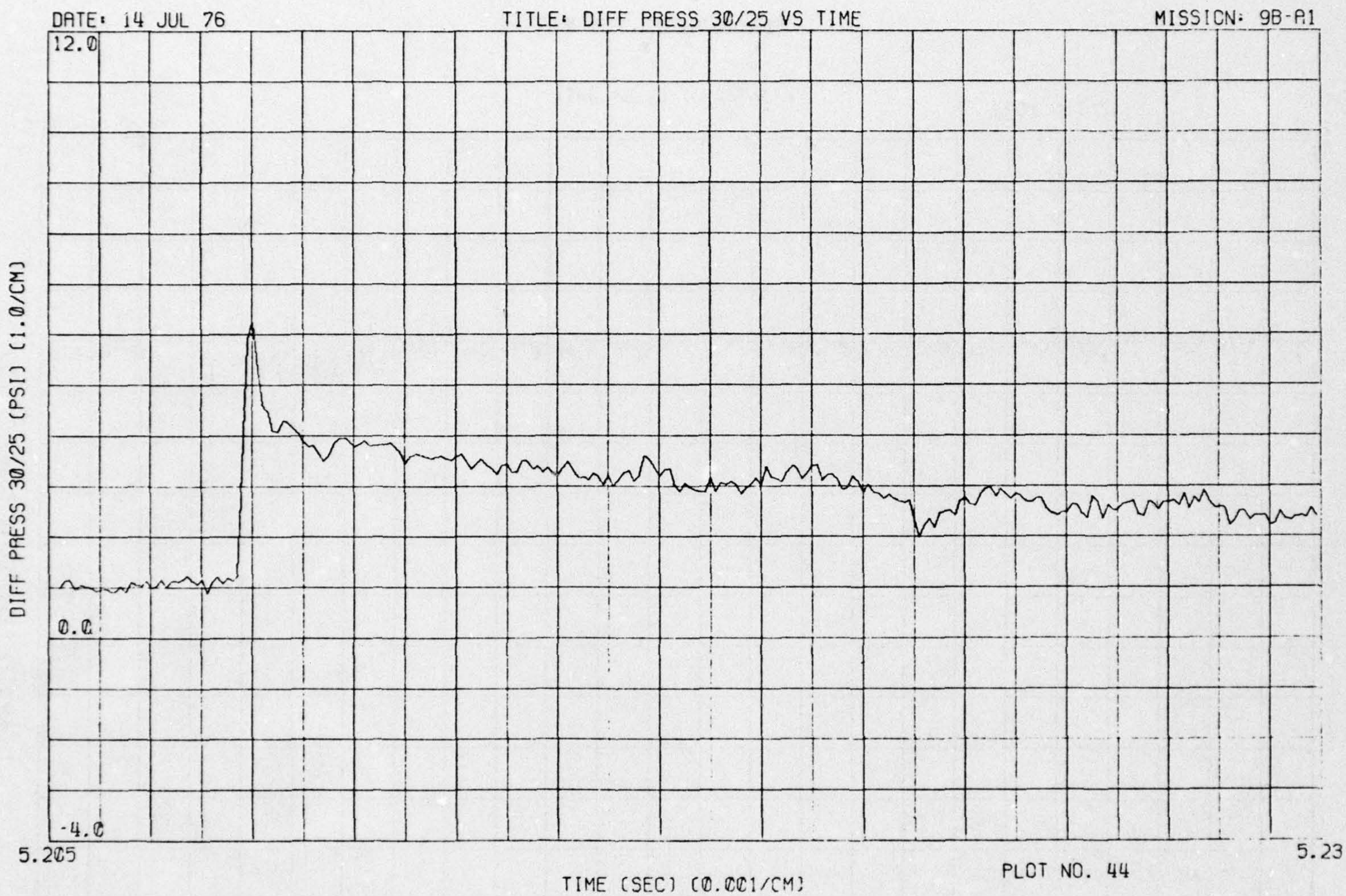


Figure 2. (Continued)

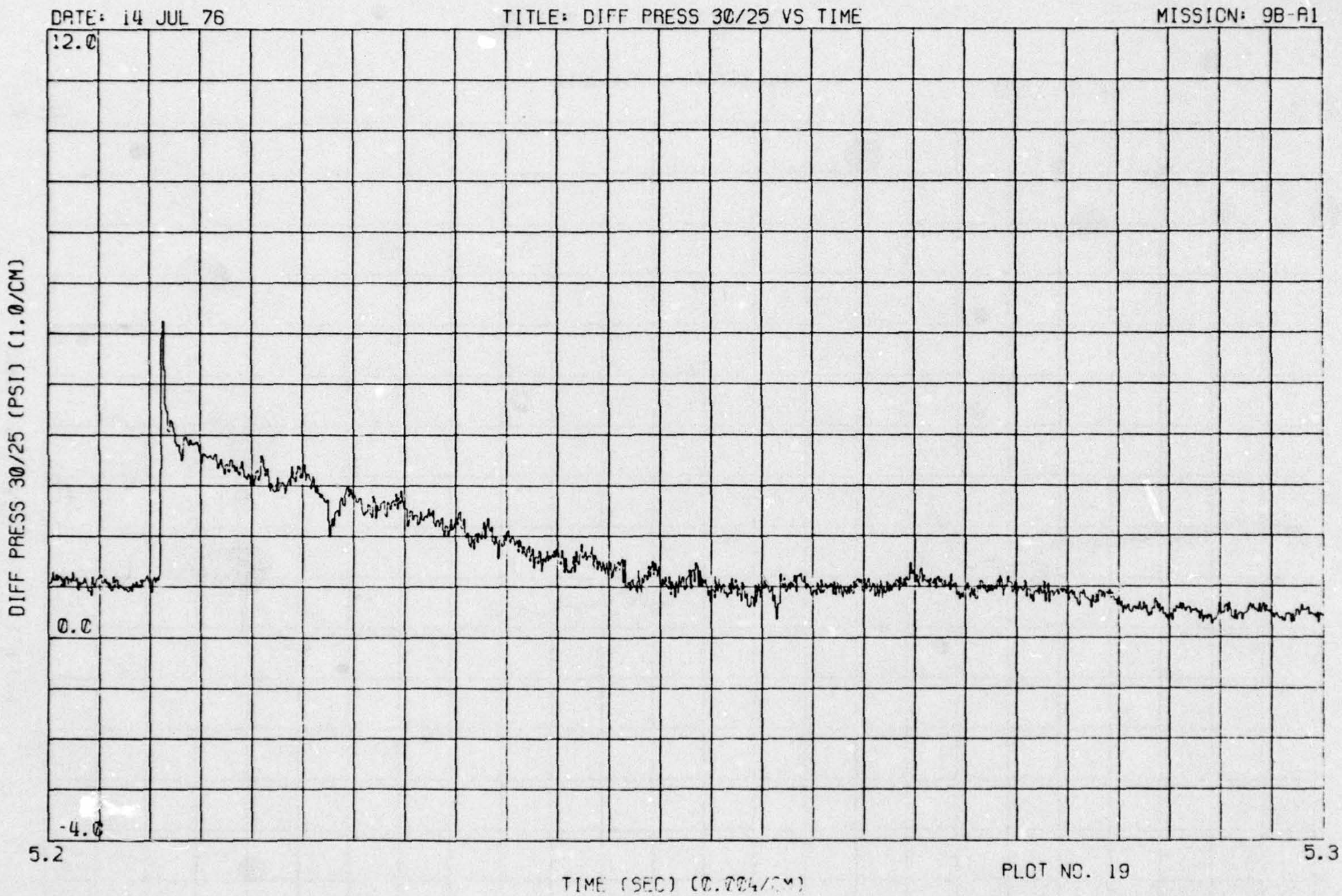


Figure 2. (Continued)

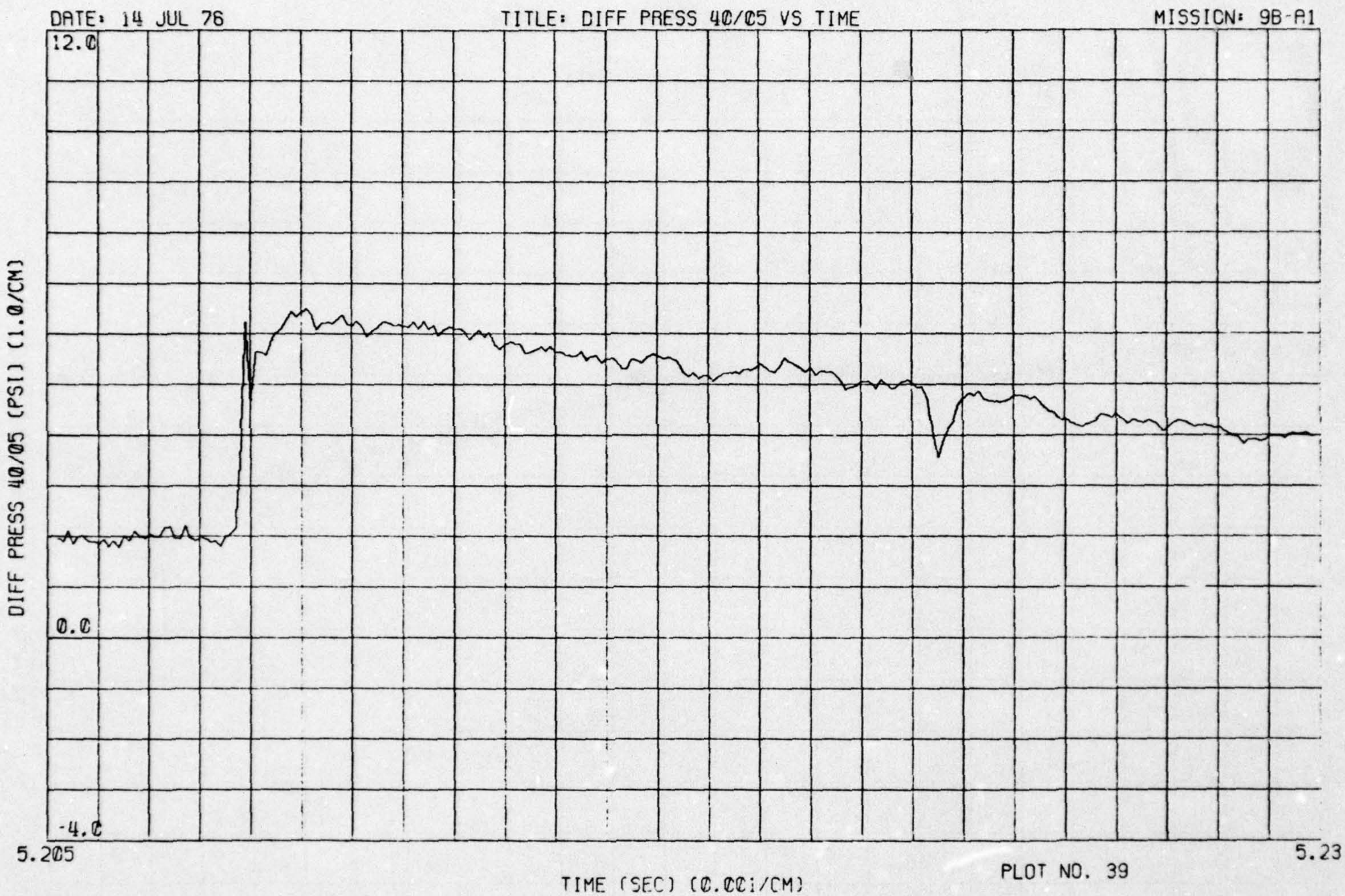


Figure 2. (Continued)

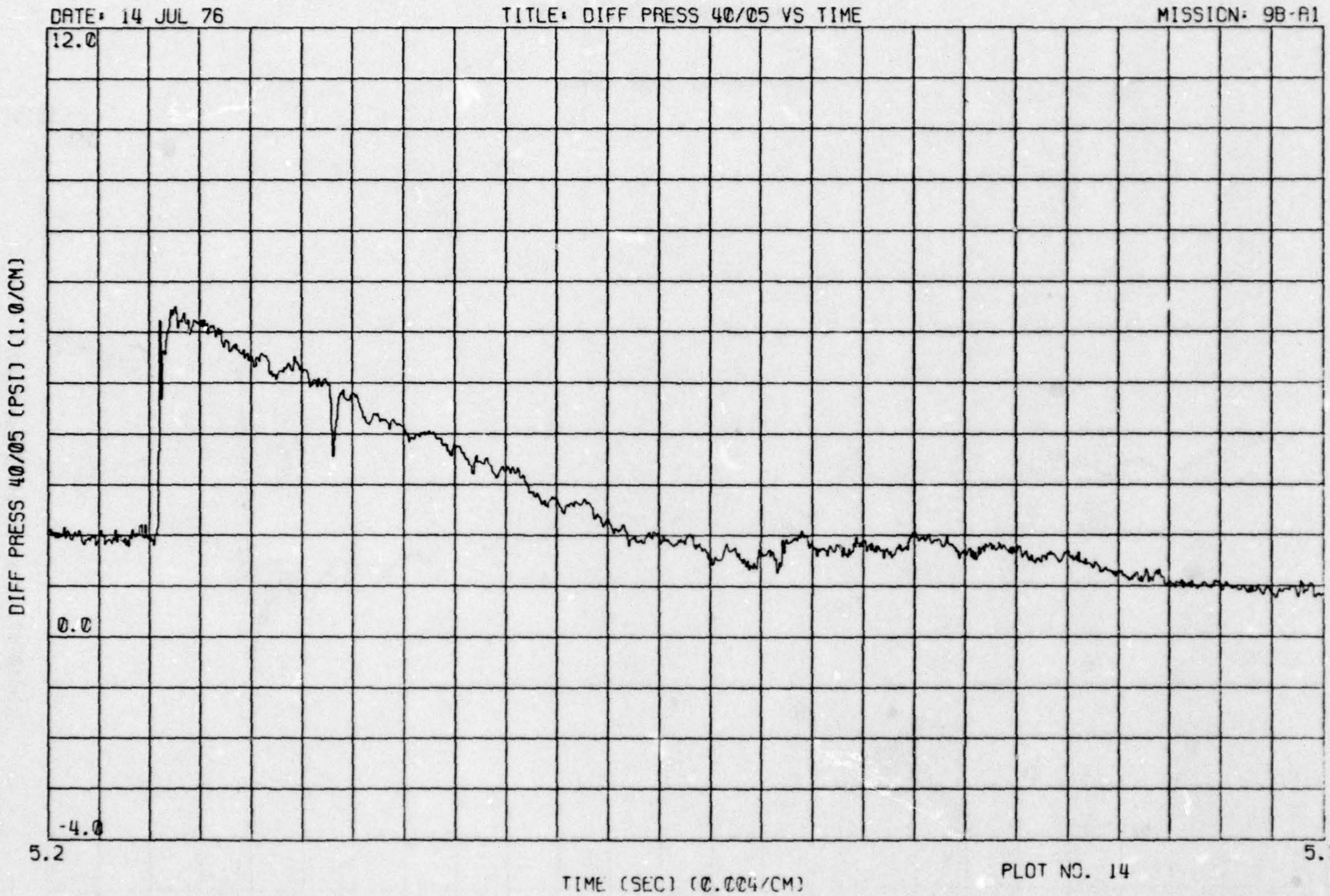


Figure 2. (Continued)

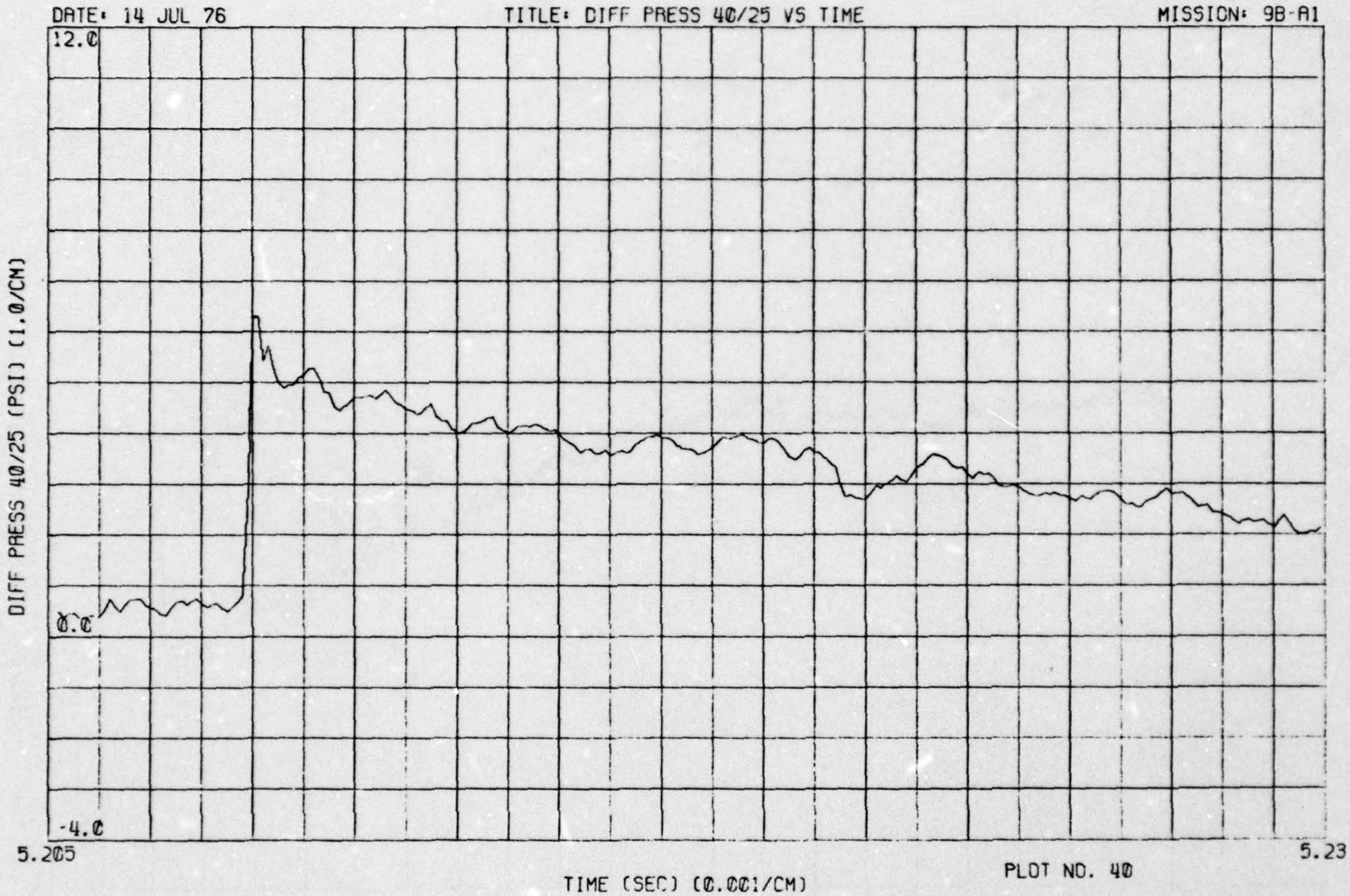


Figure 2. (Continued)

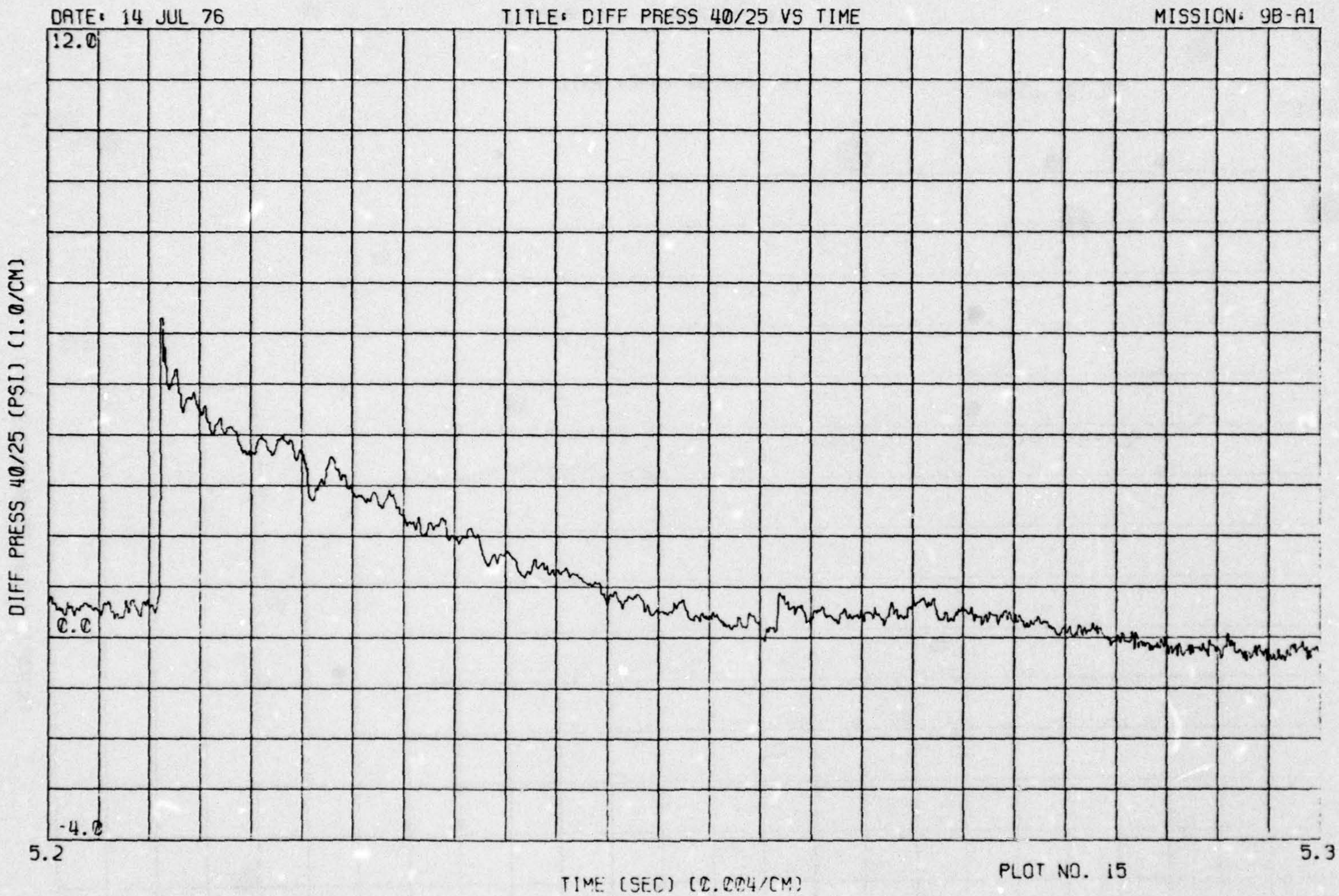


Figure 2. (Continued)

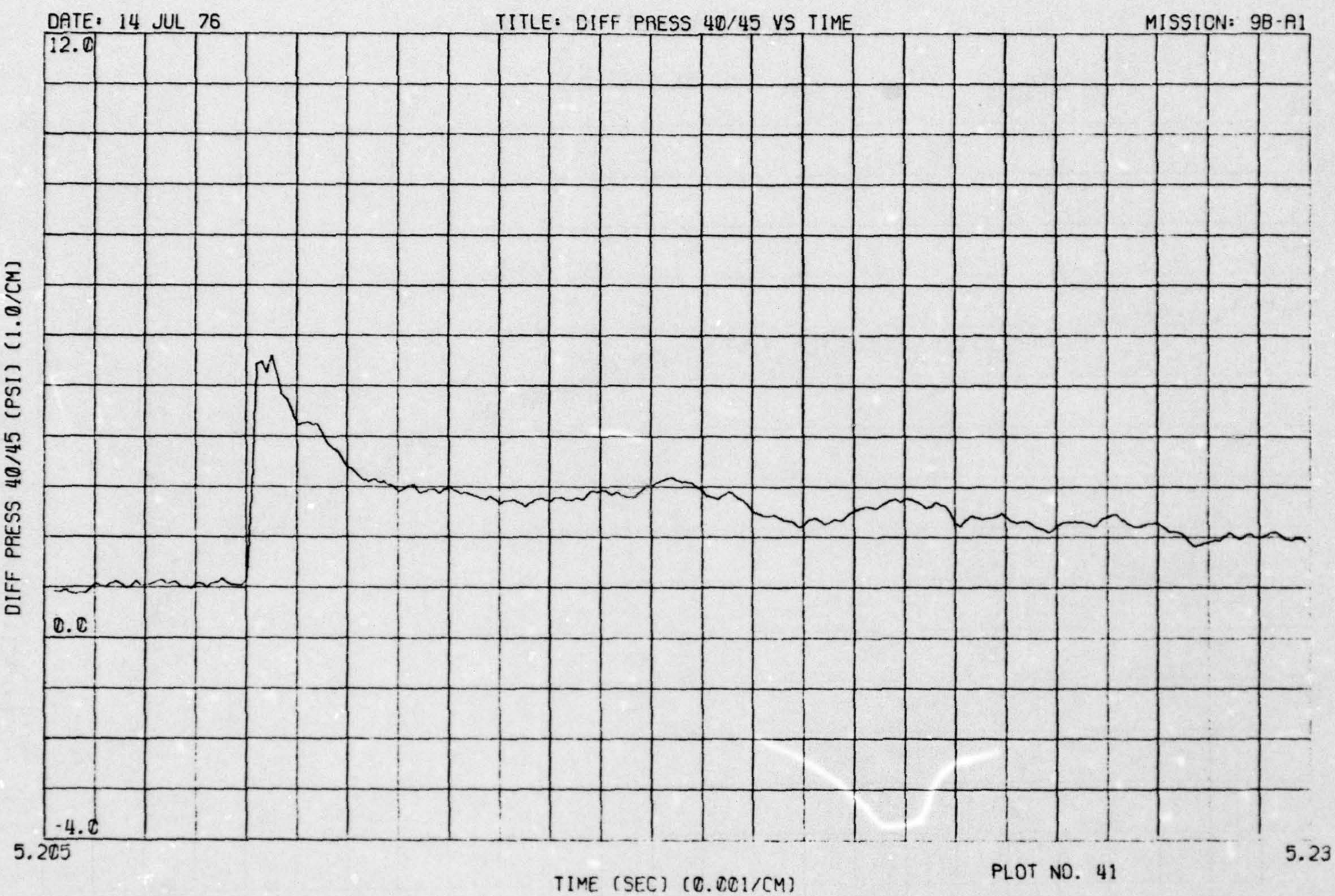


Figure 2. (Continued)

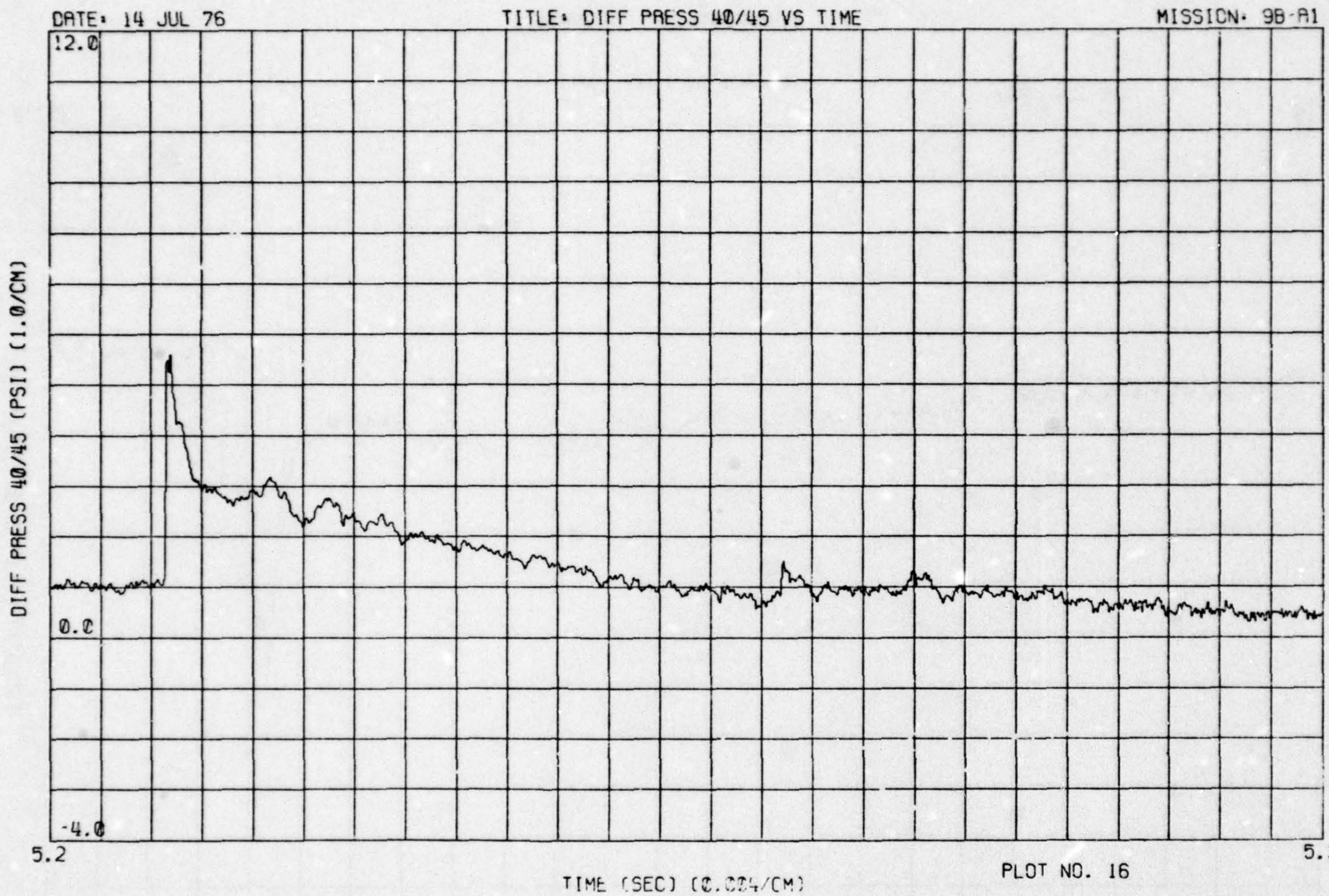


Figure 2. (Continued)

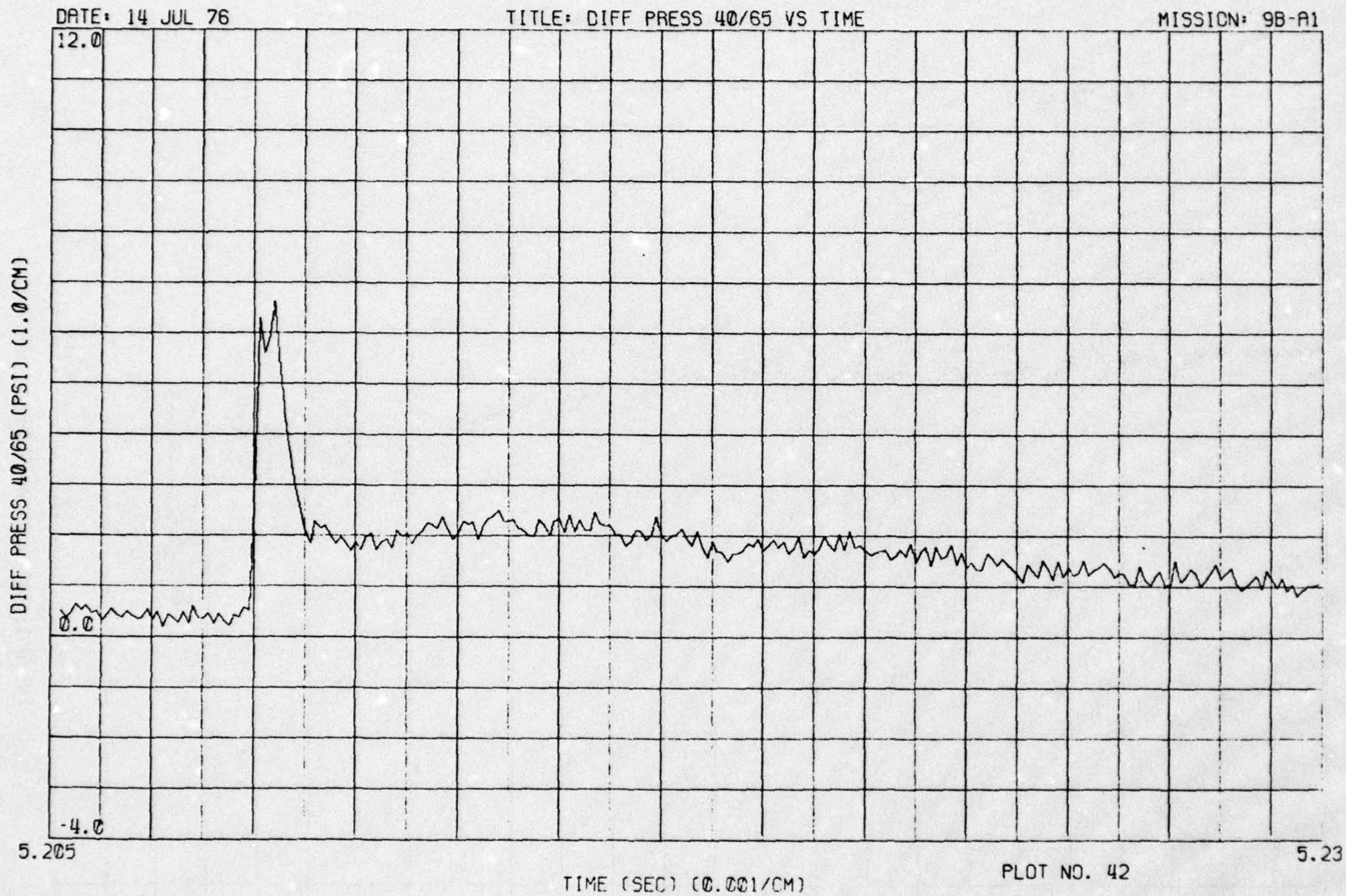


Figure 2. (Continued)

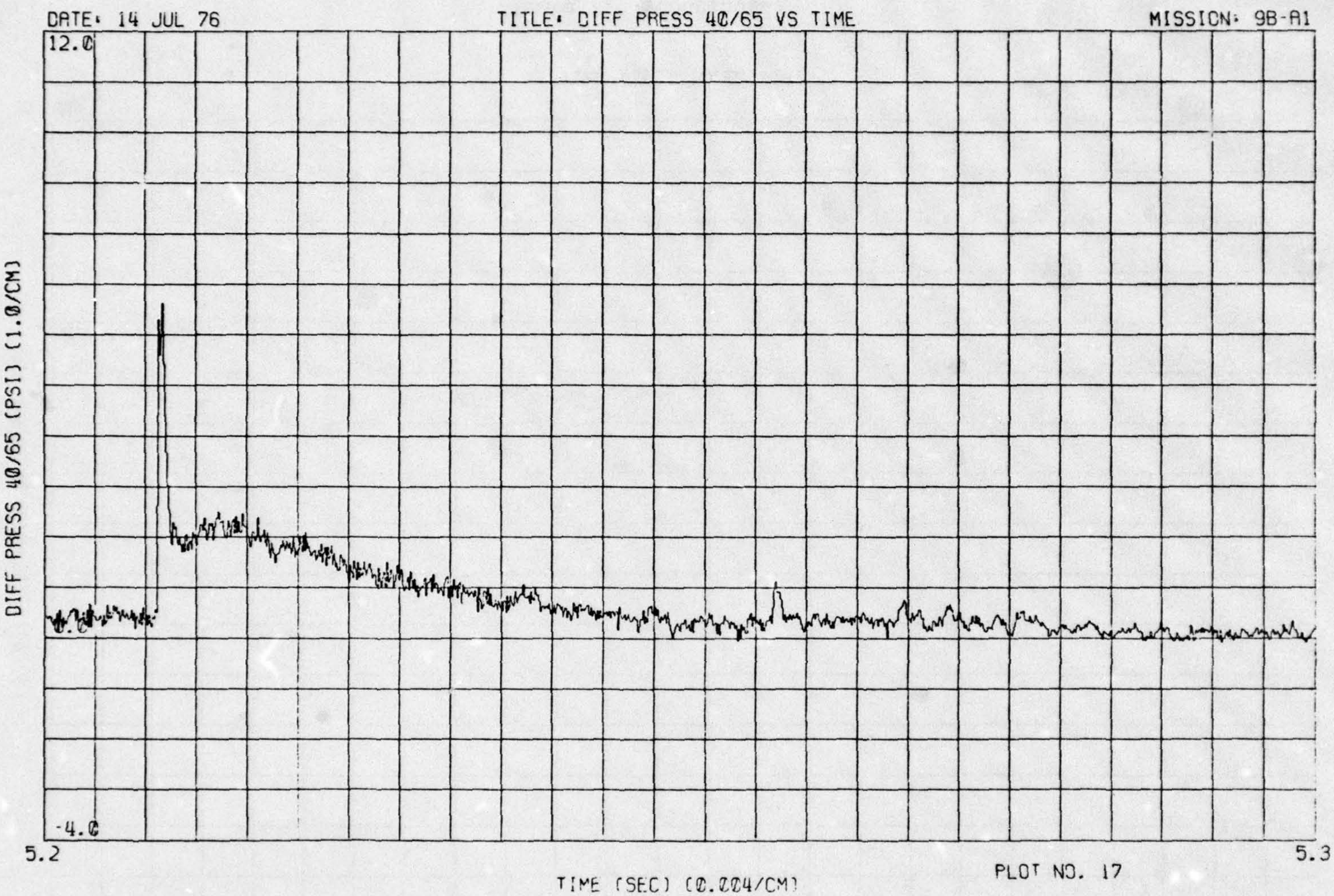


Figure 2. (Continued)

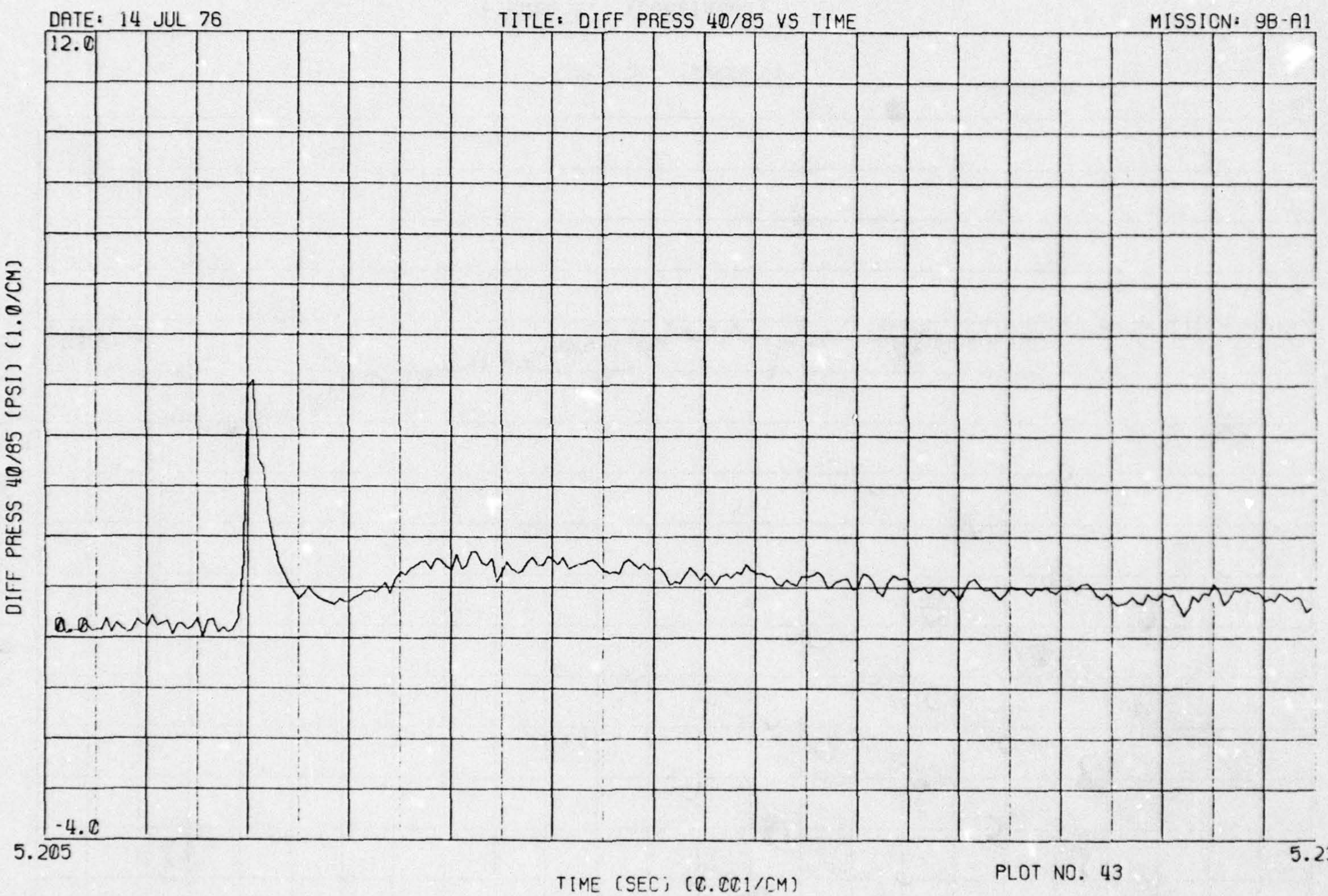


Figure 2. (Continued)

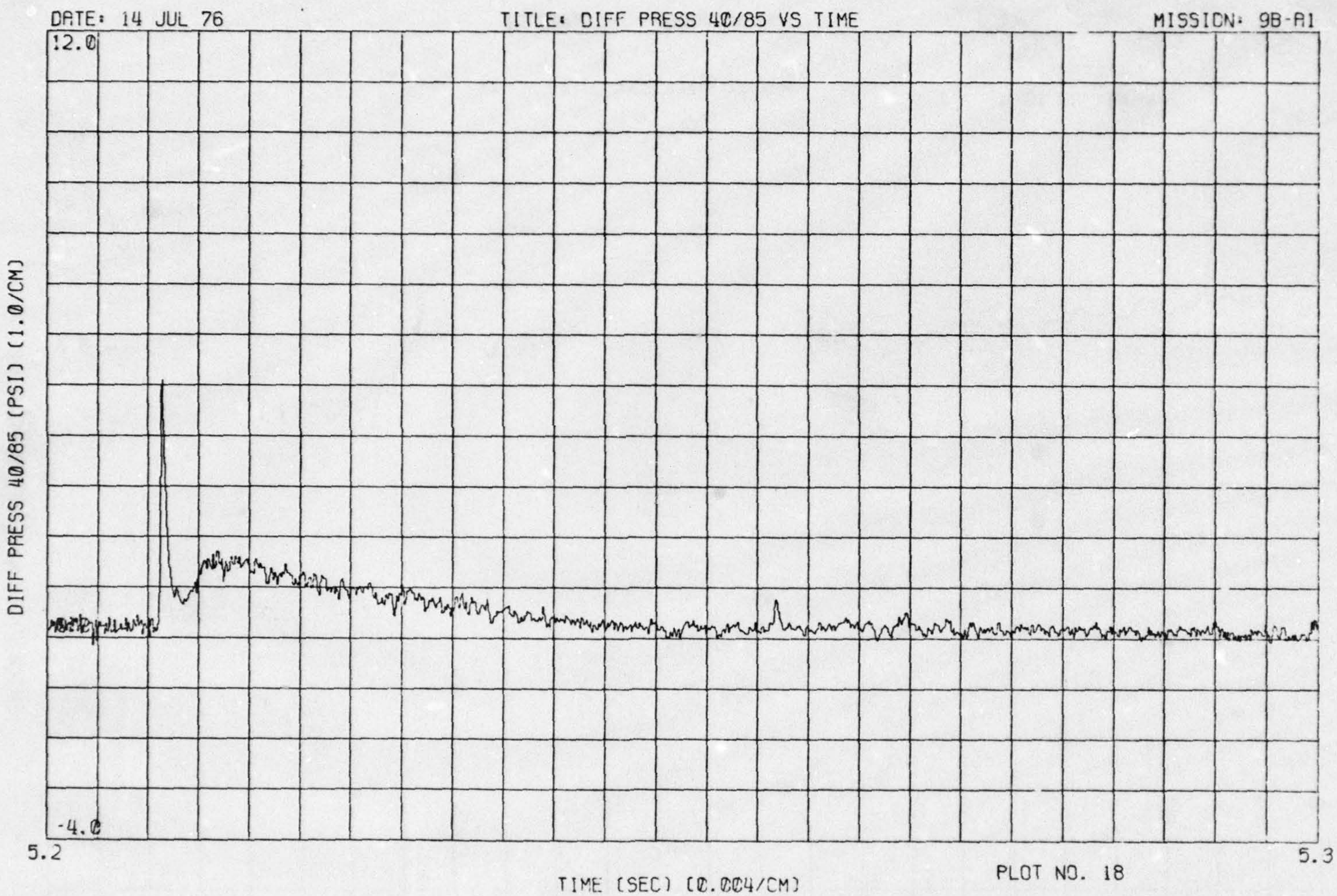


Figure 2. (Continued)

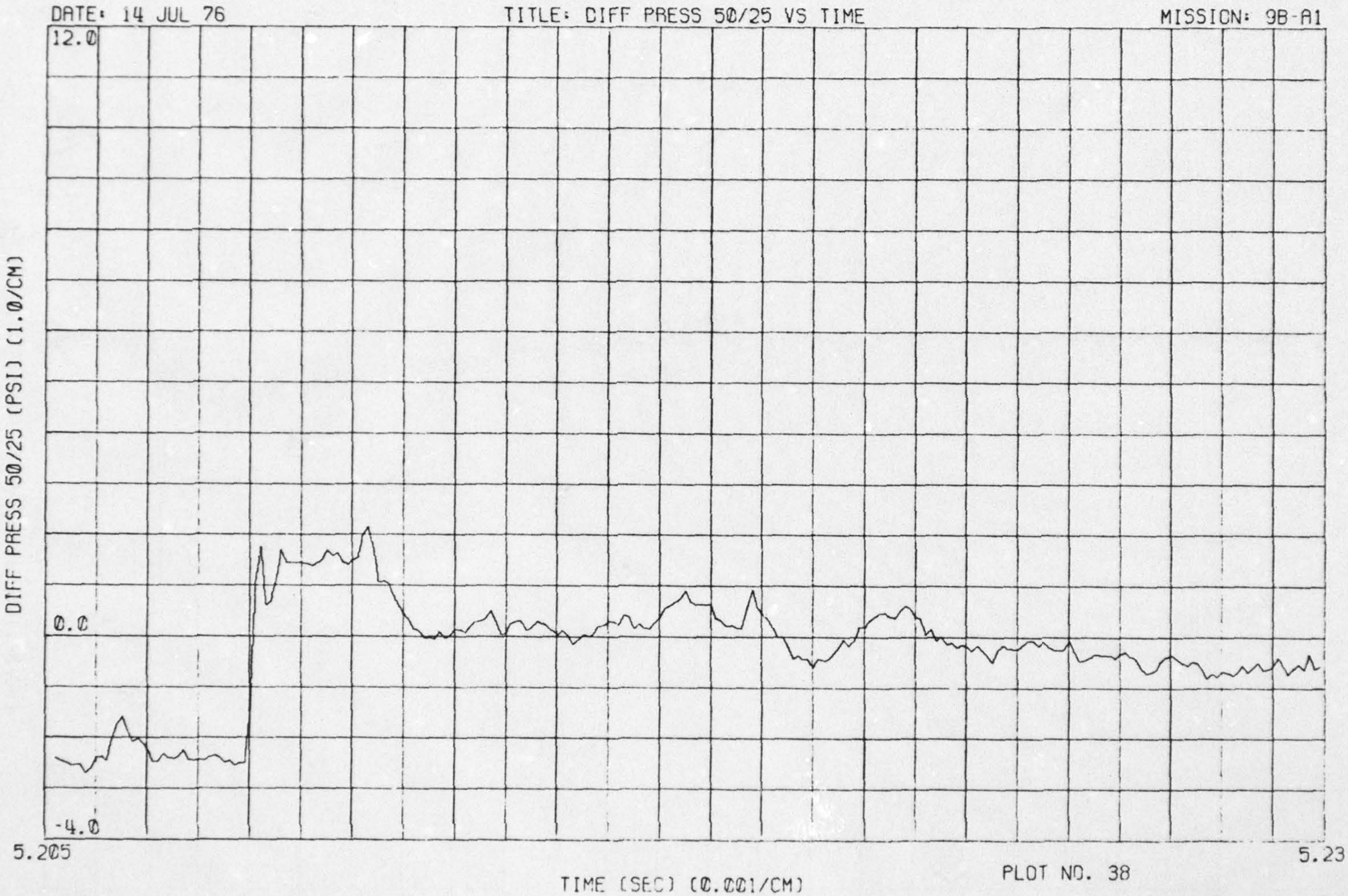


Figure 2. (Continued)

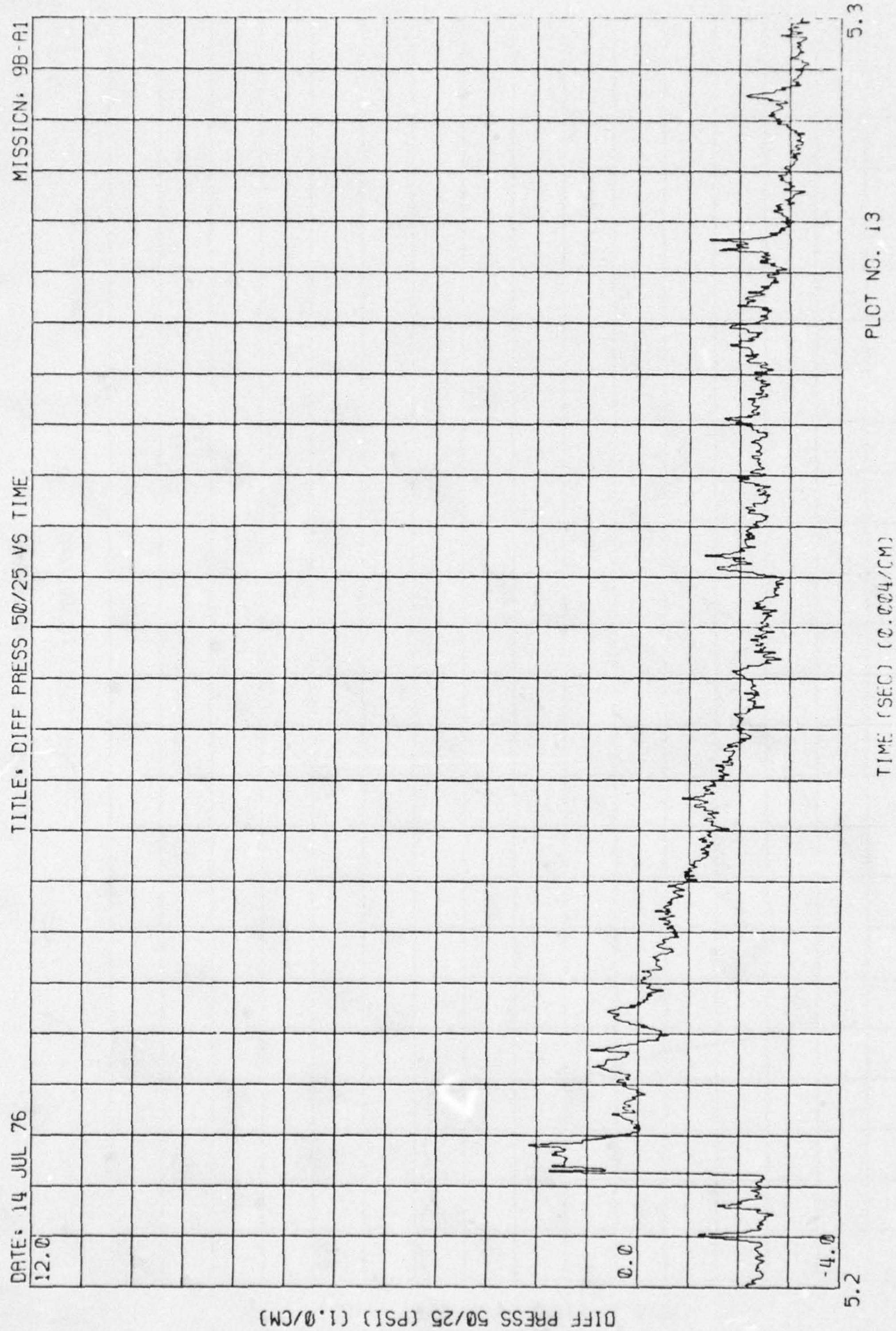


Figure 2. (Continued)

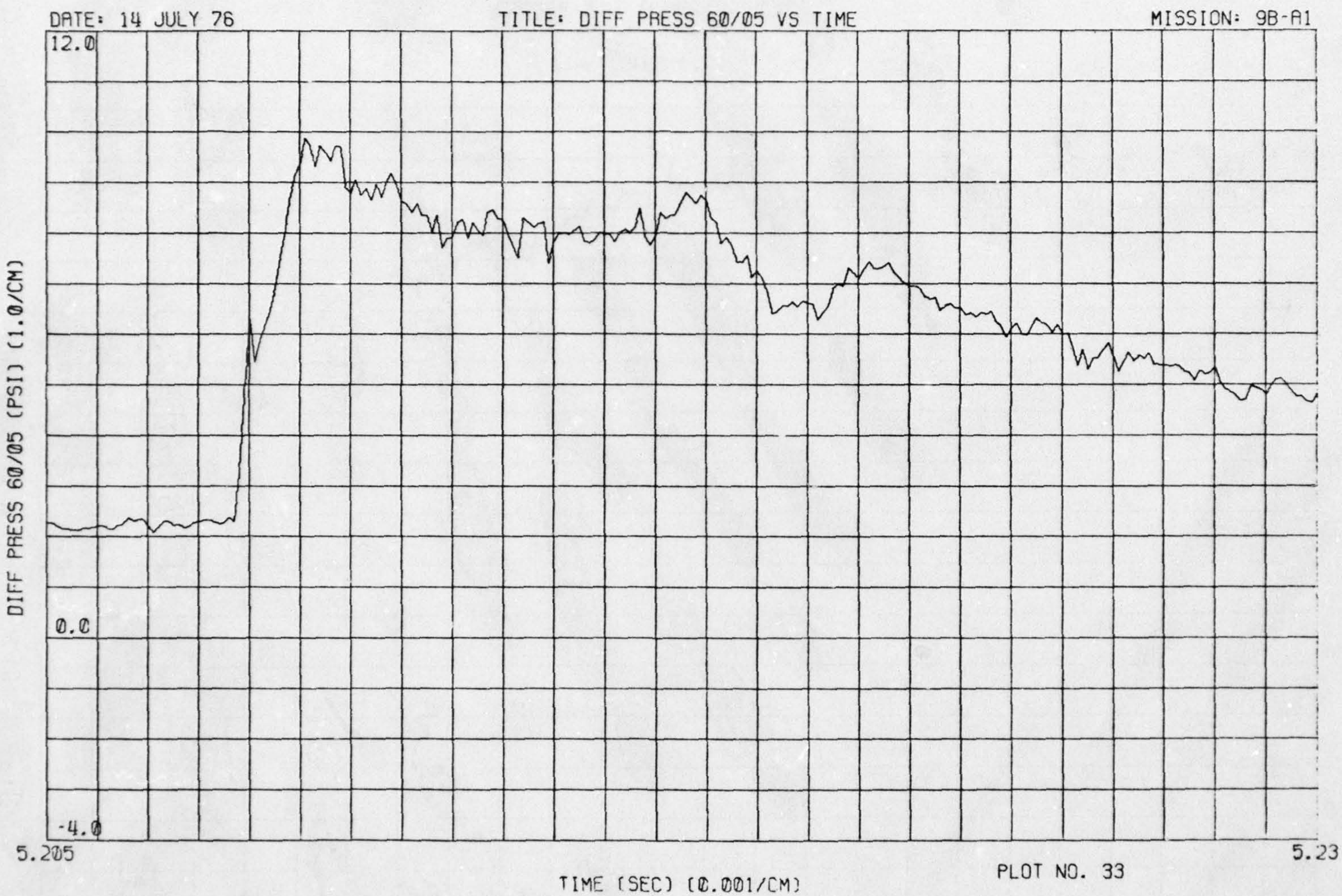


Figure 2. (Continued)

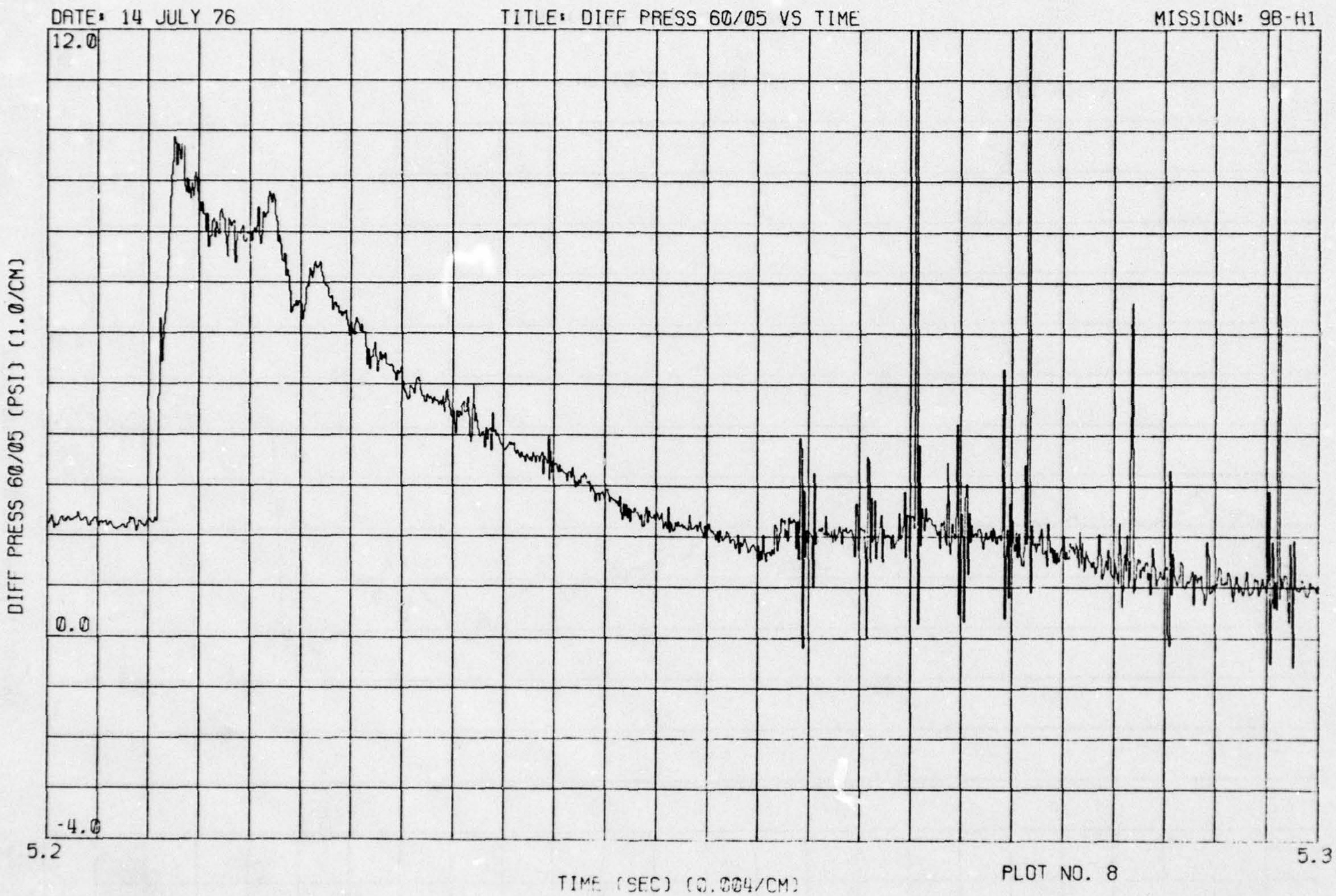


Figure 2. (Continued)

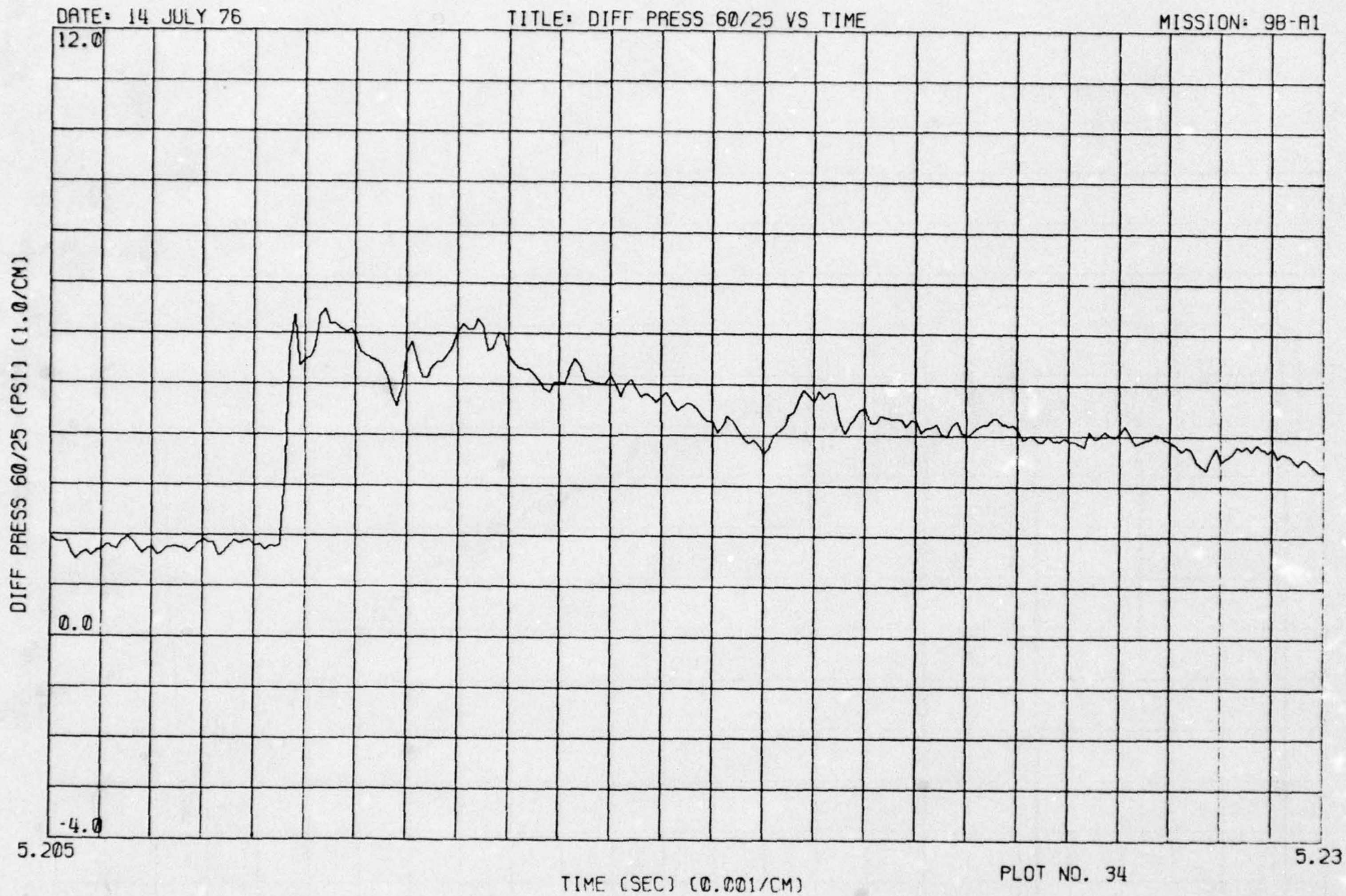


Figure 2. (Continued)

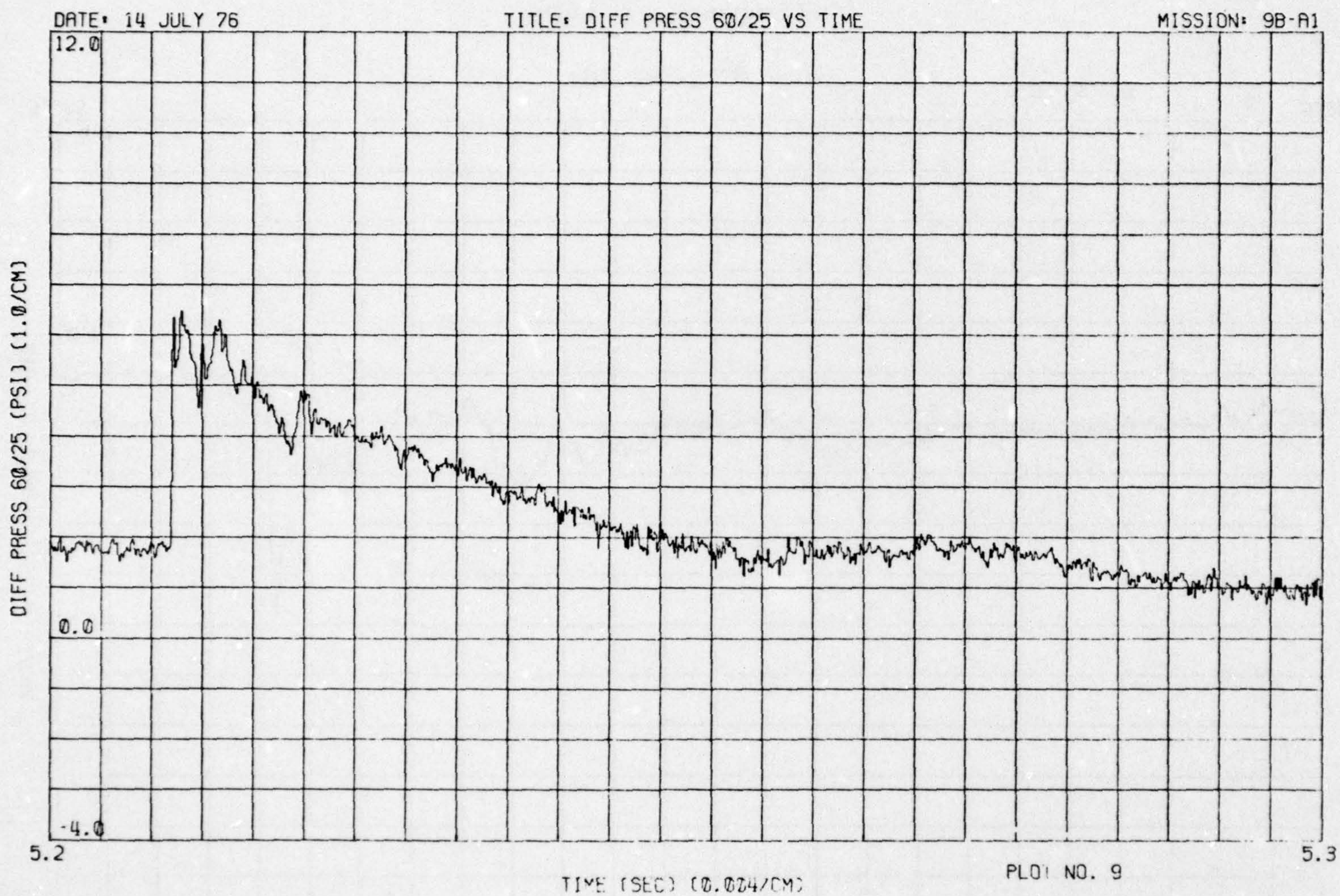


Figure 2. (Continued)

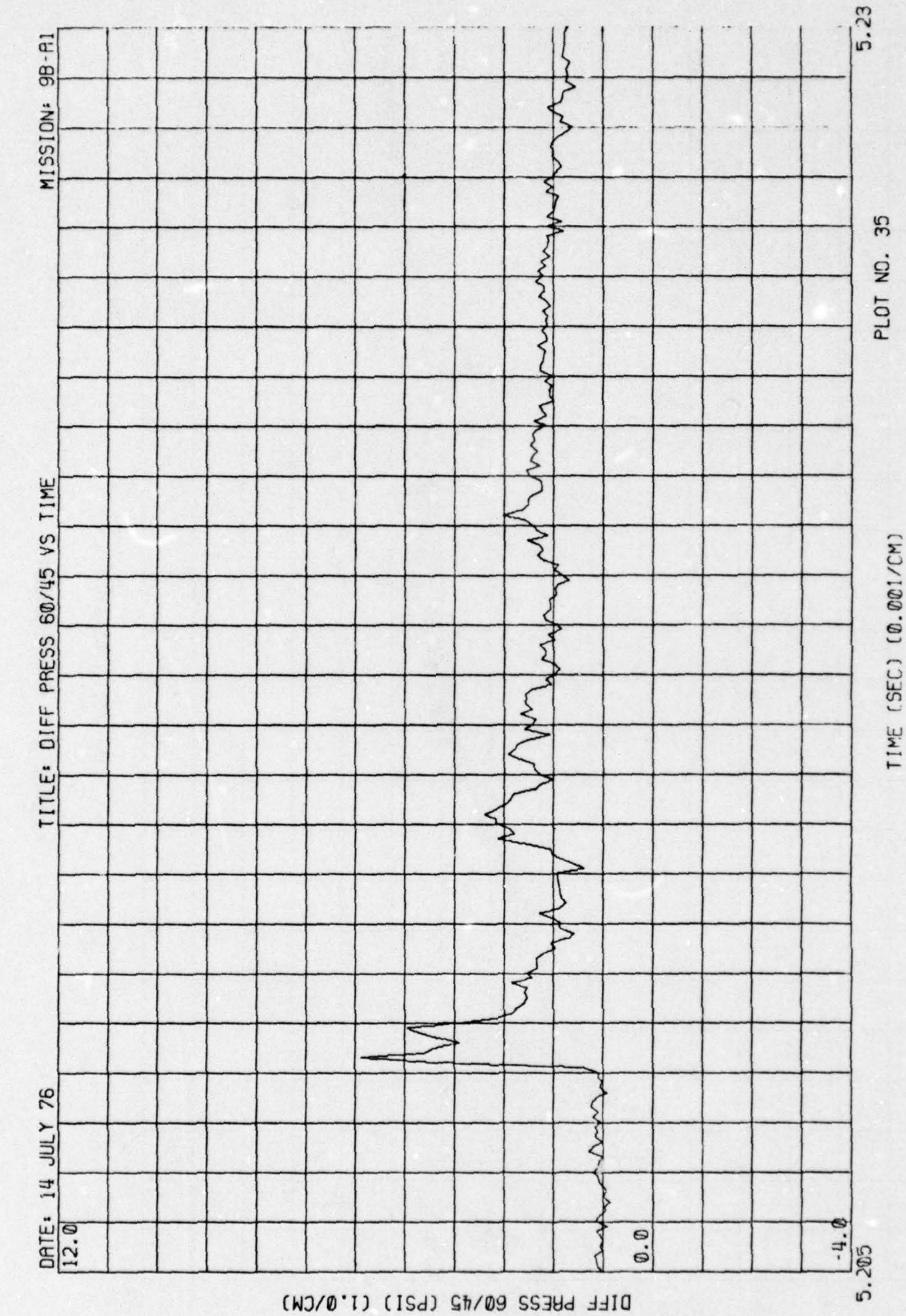


Figure 2. (Continued)

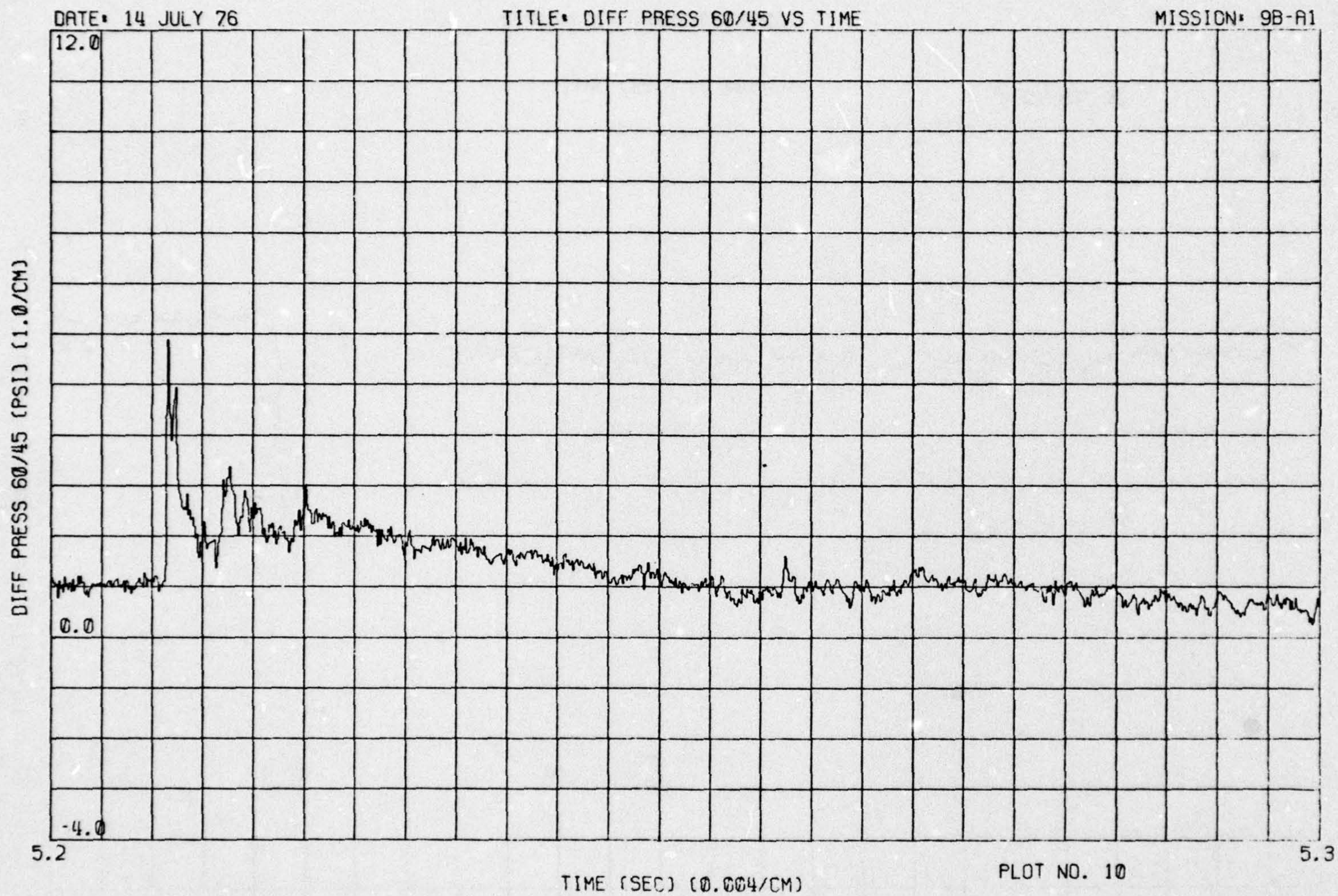


Figure 2. (Continued)

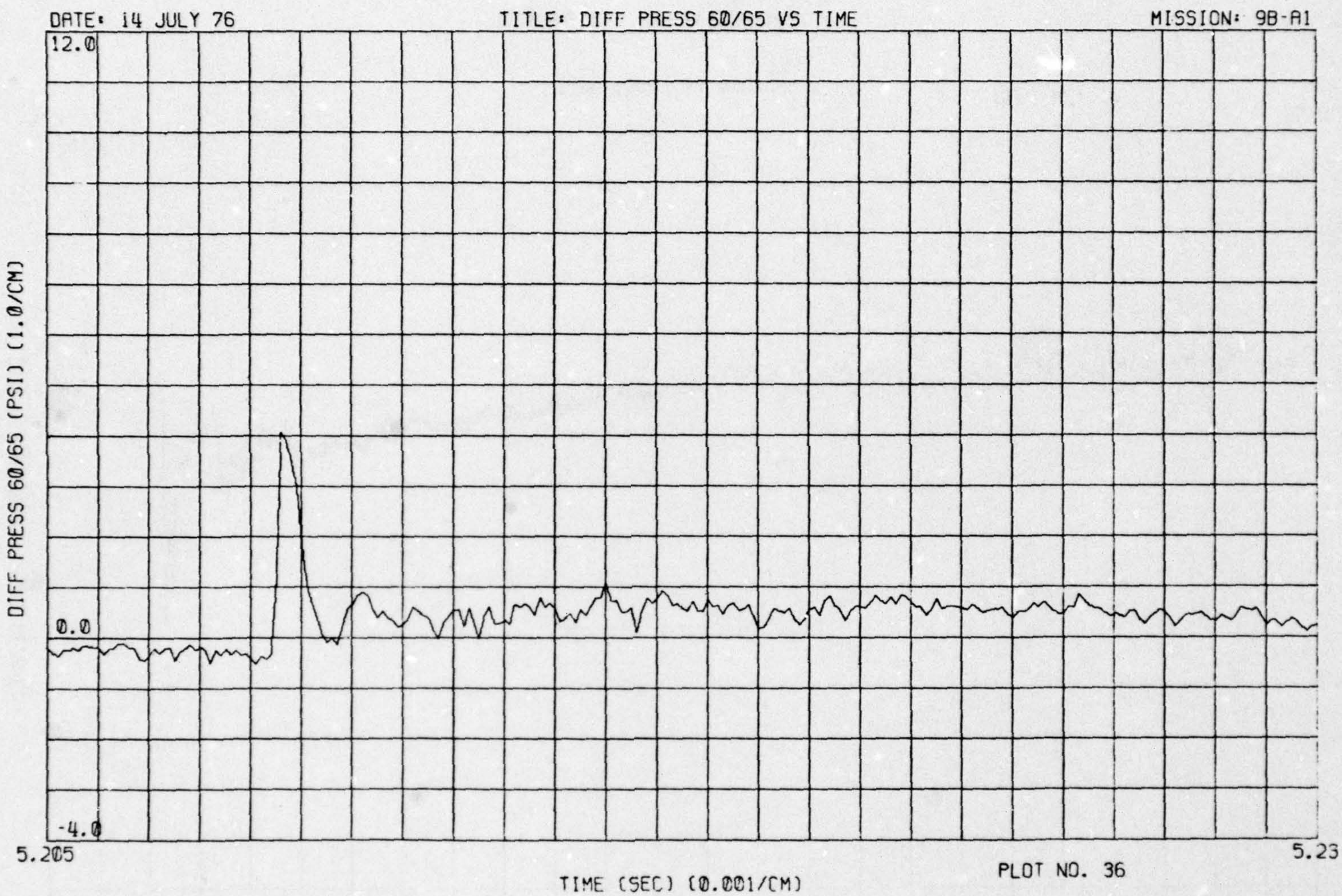


Figure 2. (Continued)

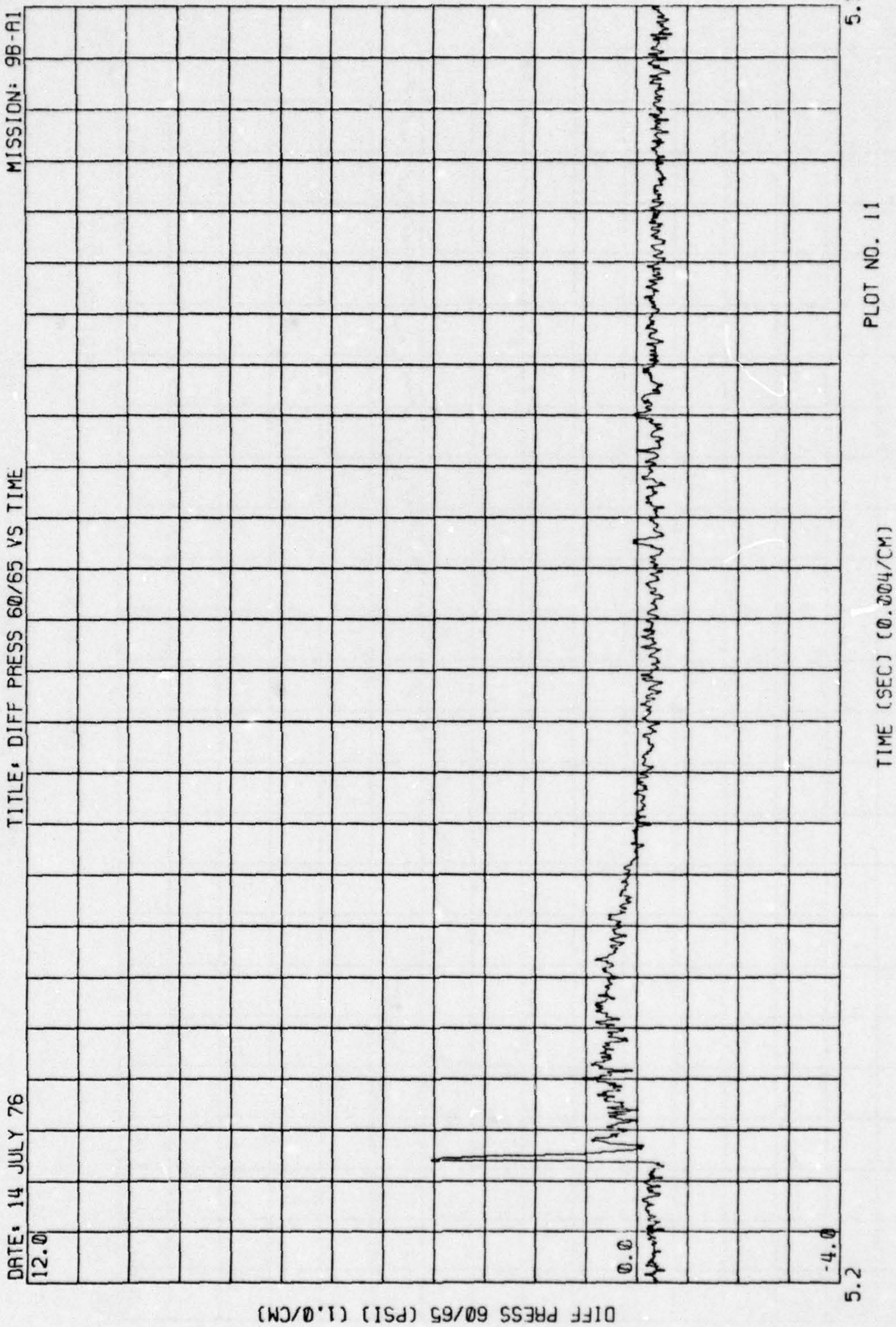


Figure 2. (Continued)

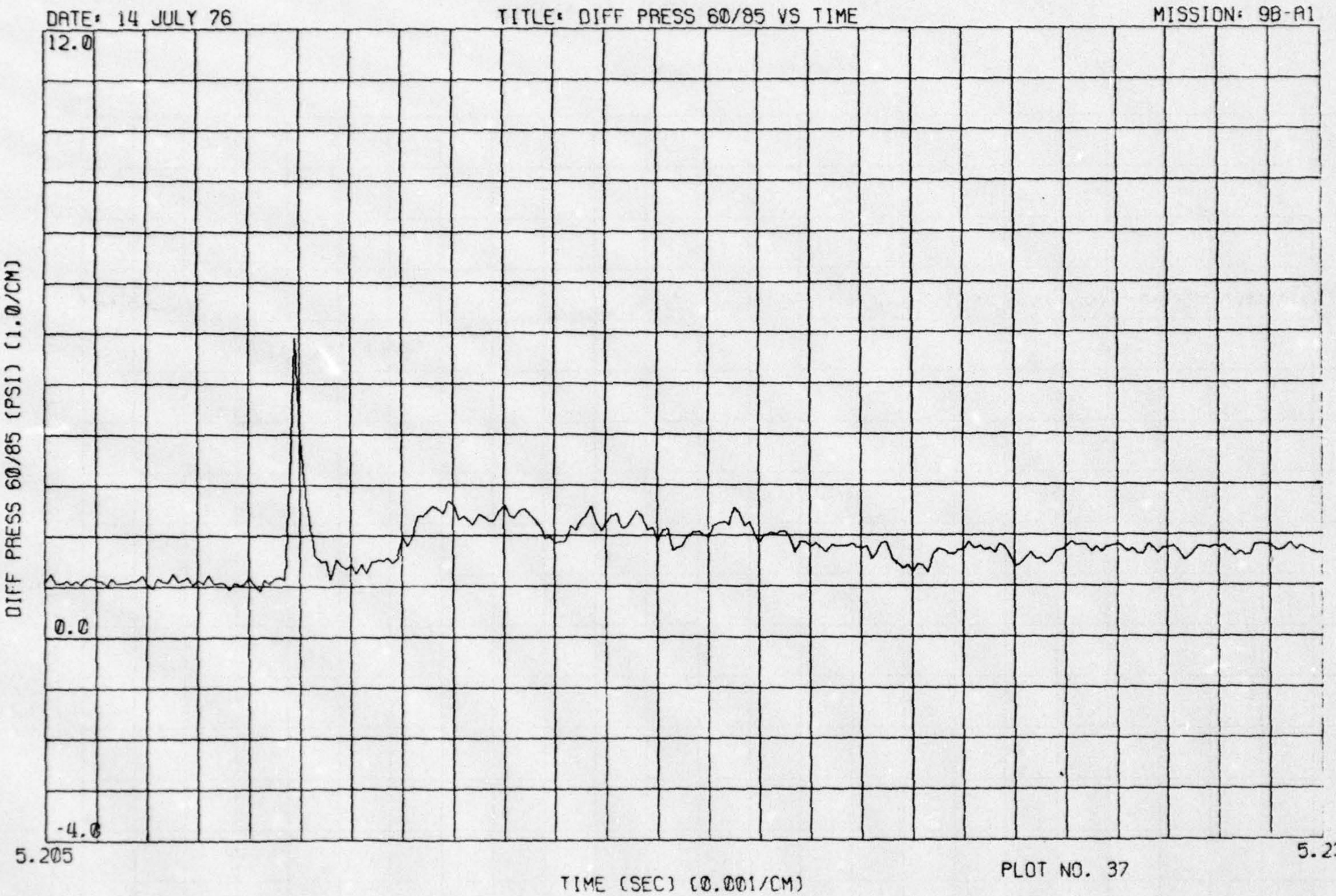


Figure 2. (Continued)

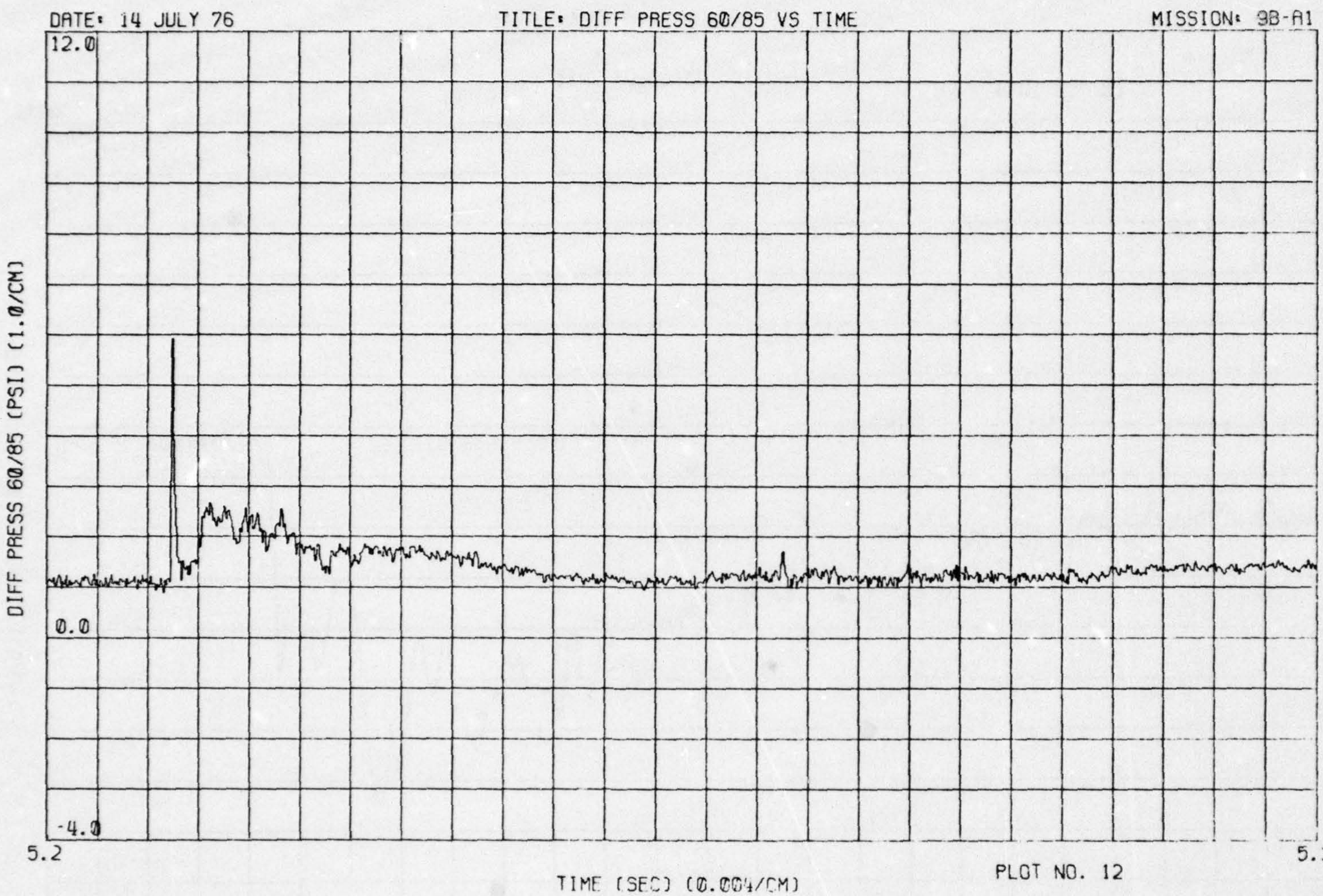


Figure 2. (Continued)

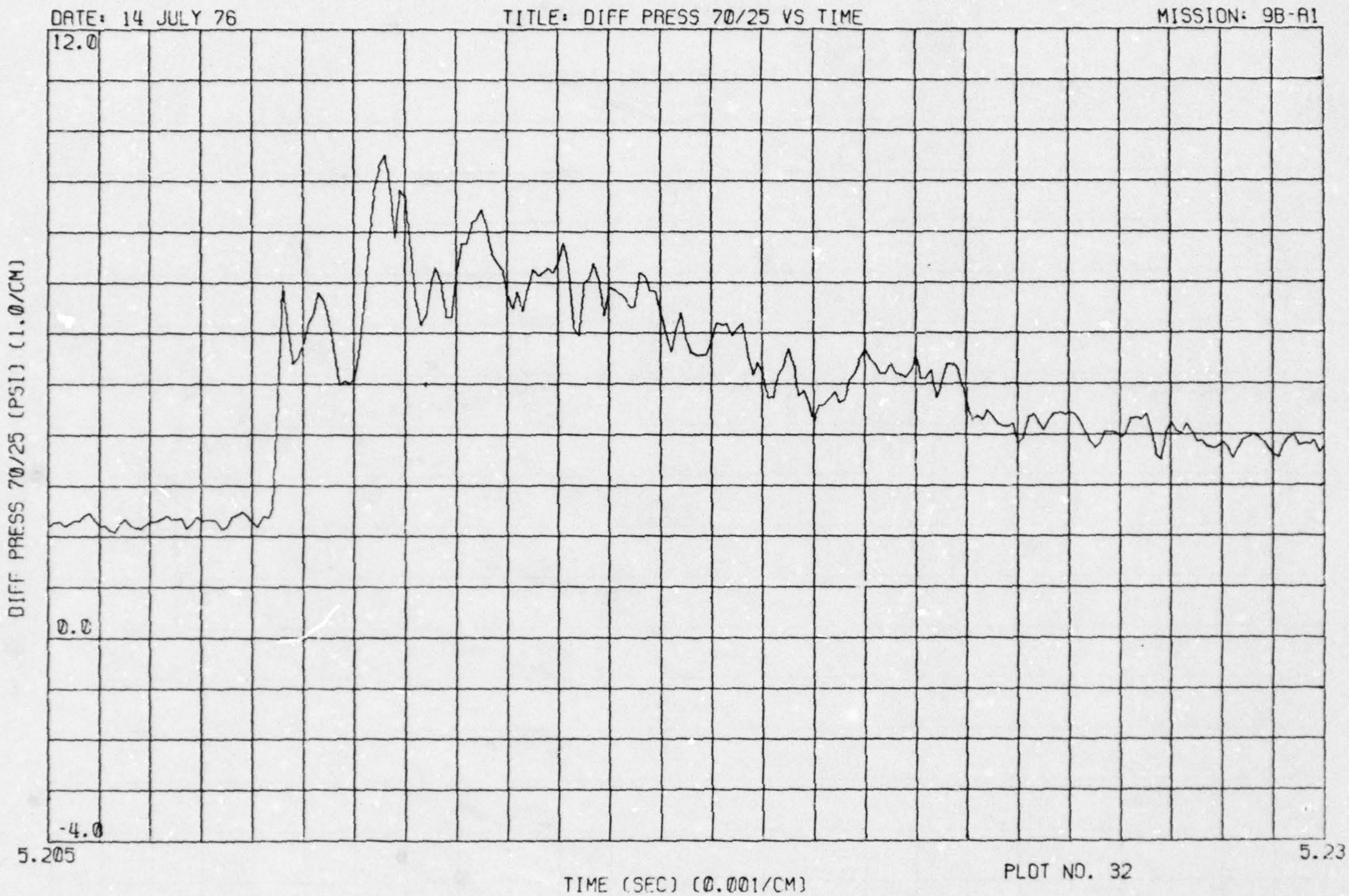


Figure 2. (Continued)

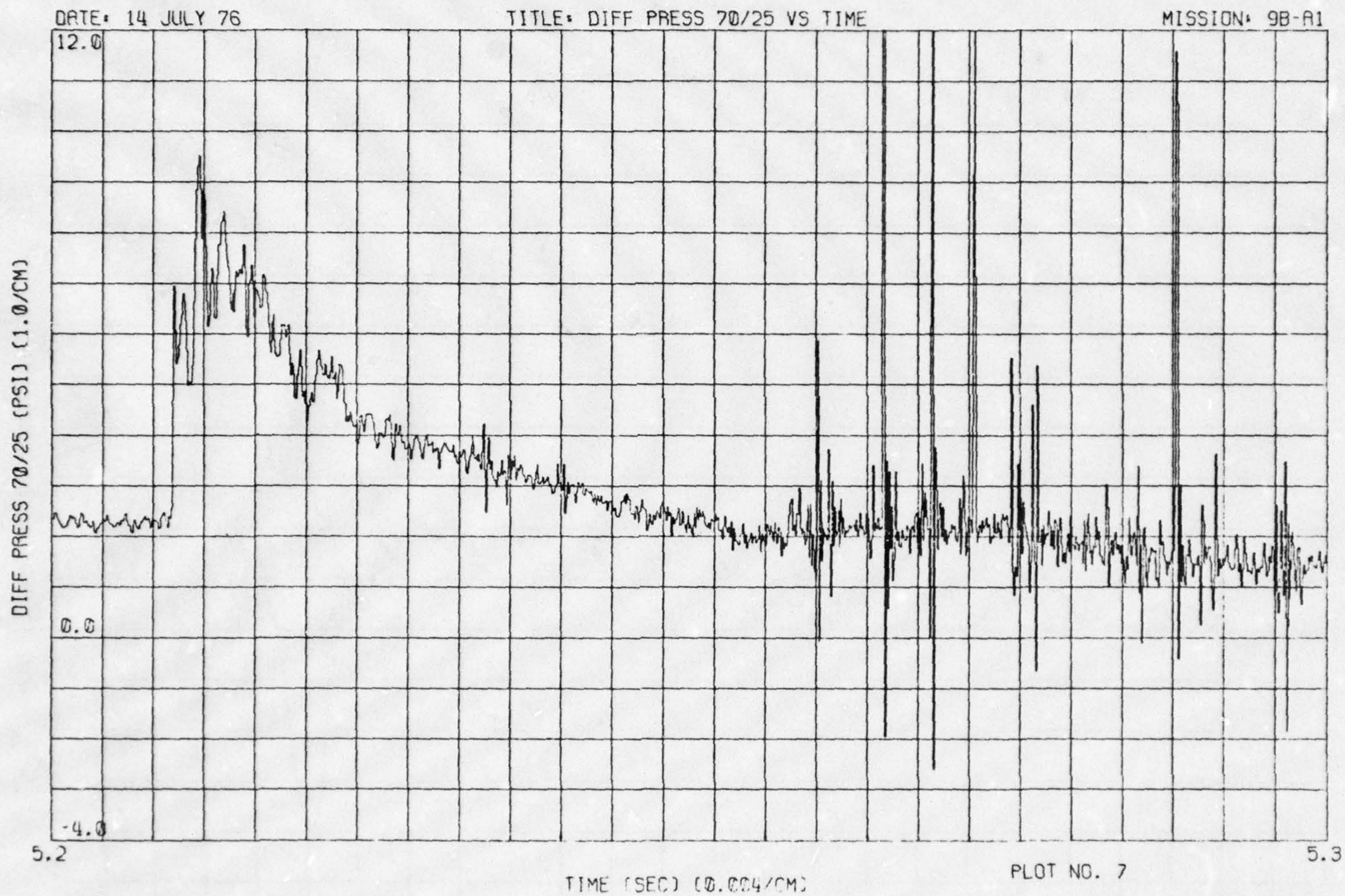


Figure 2. (Continued)

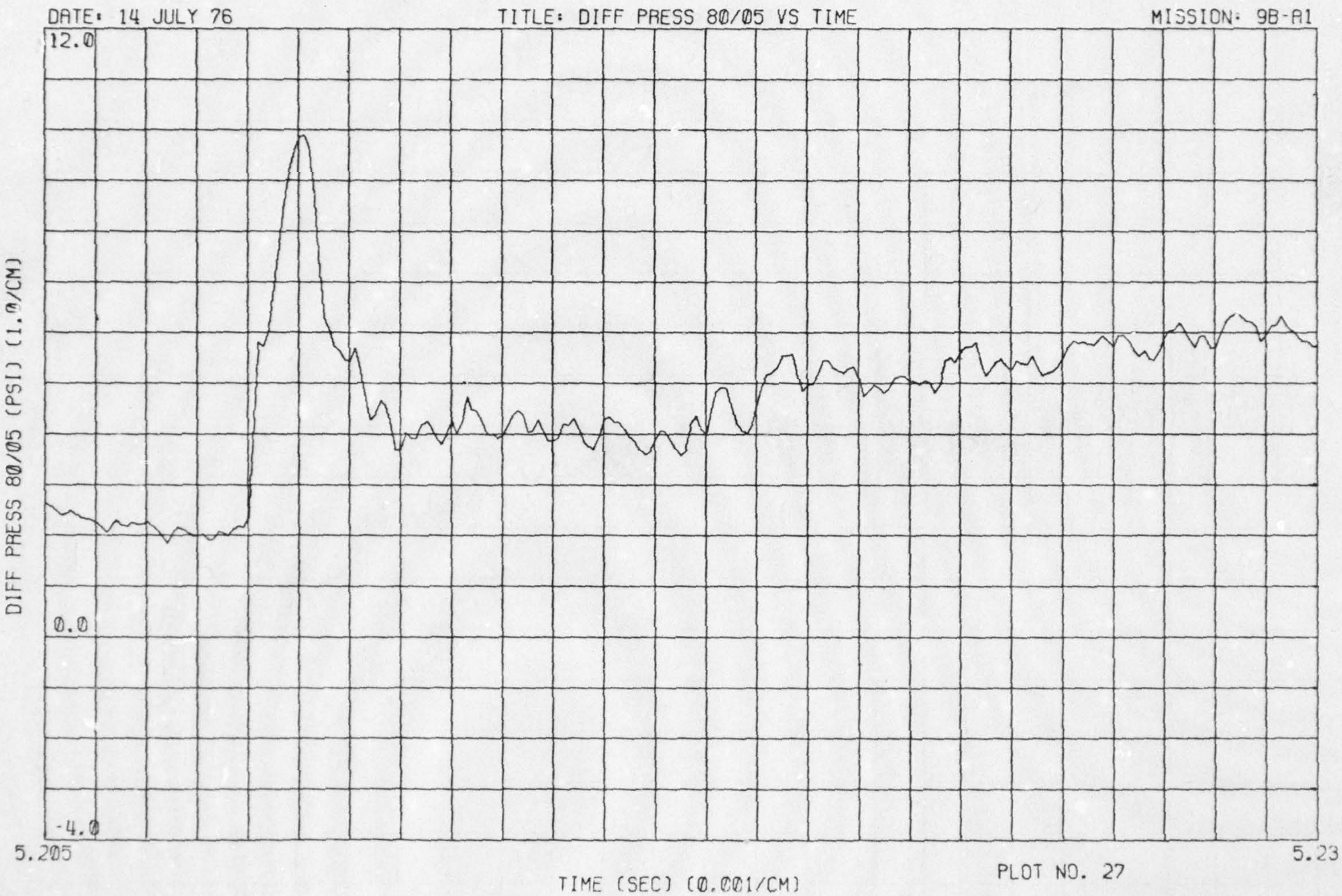


Figure 2. (Continued)

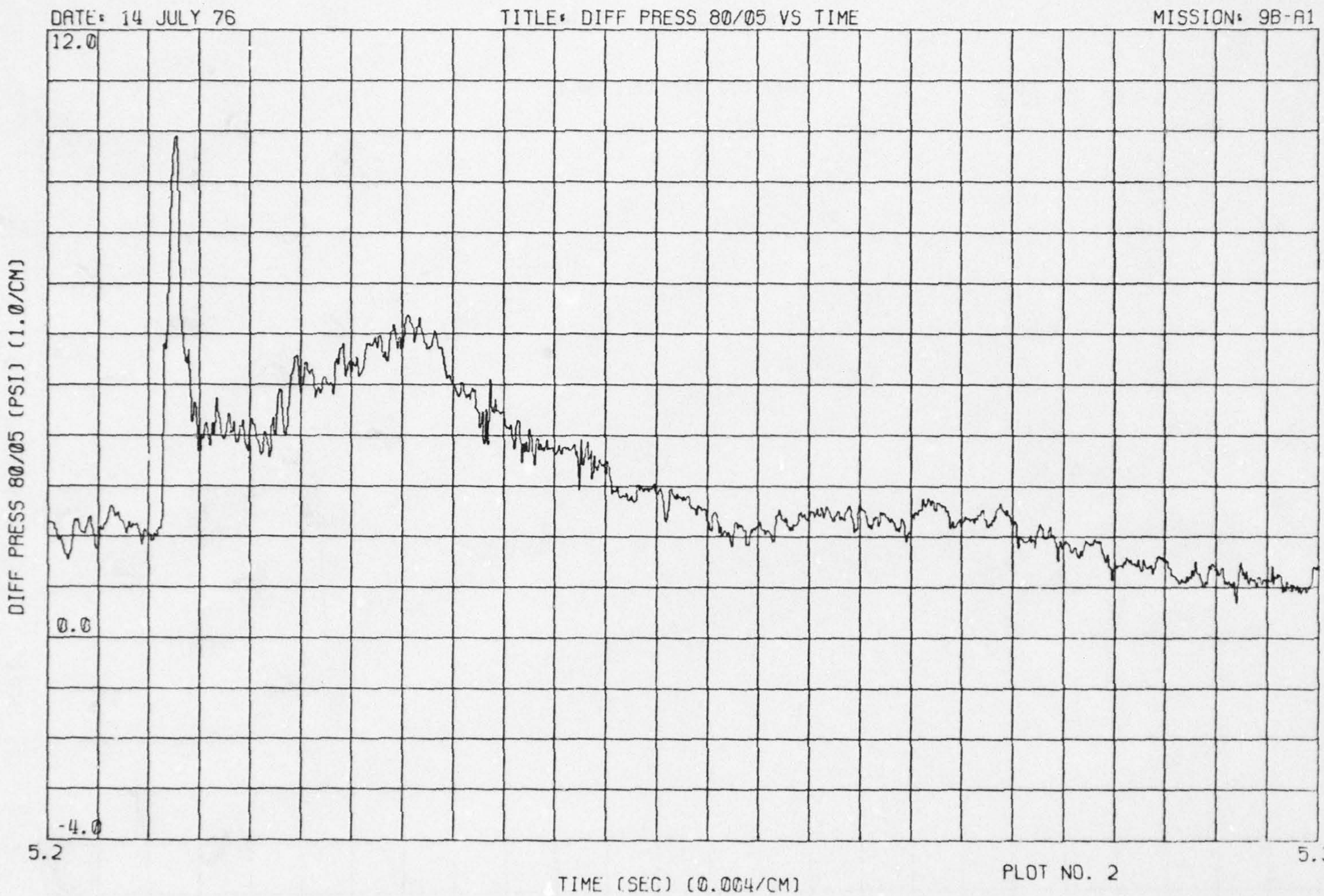


Figure 2. (Continued)

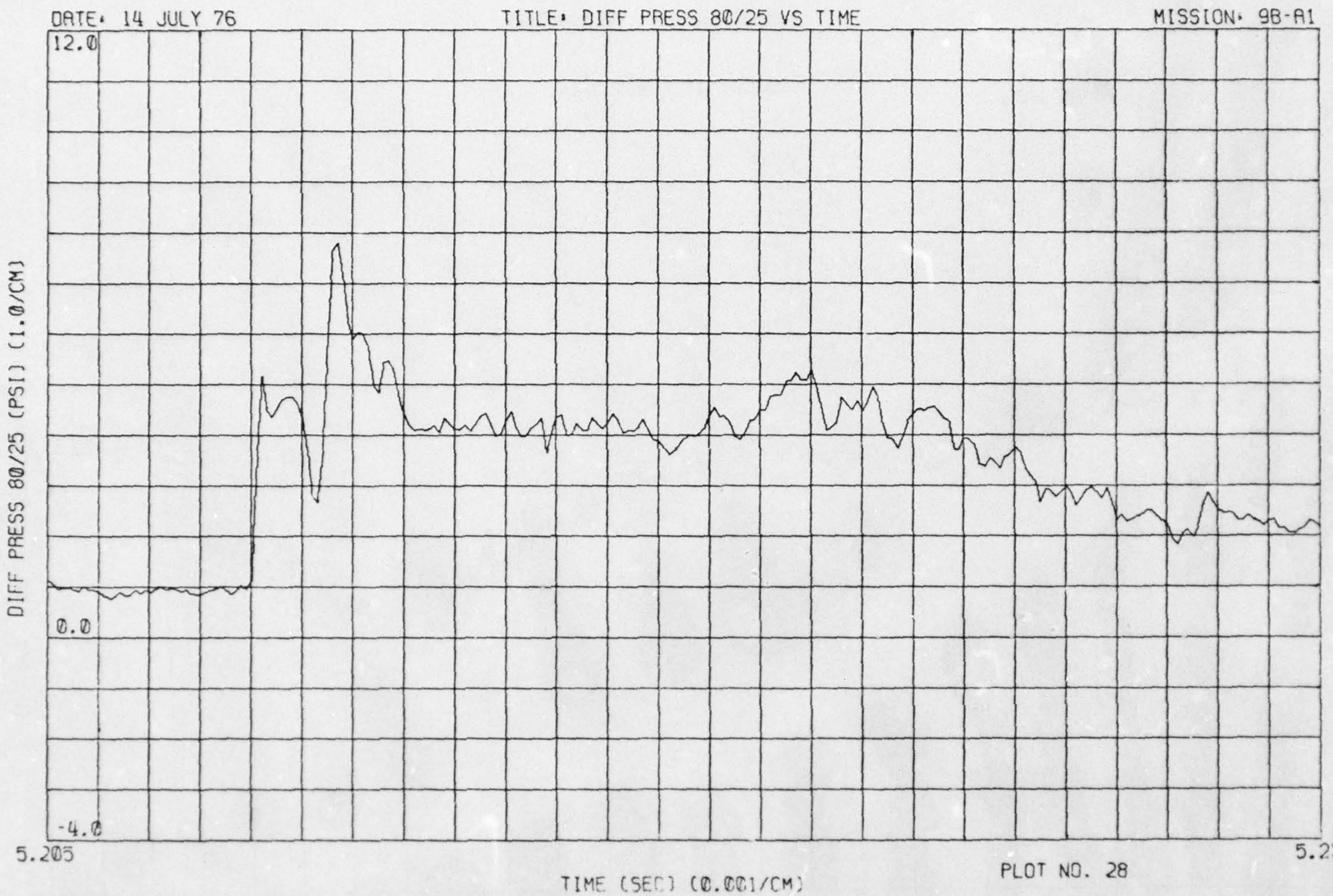


Figure 2. (Continued)

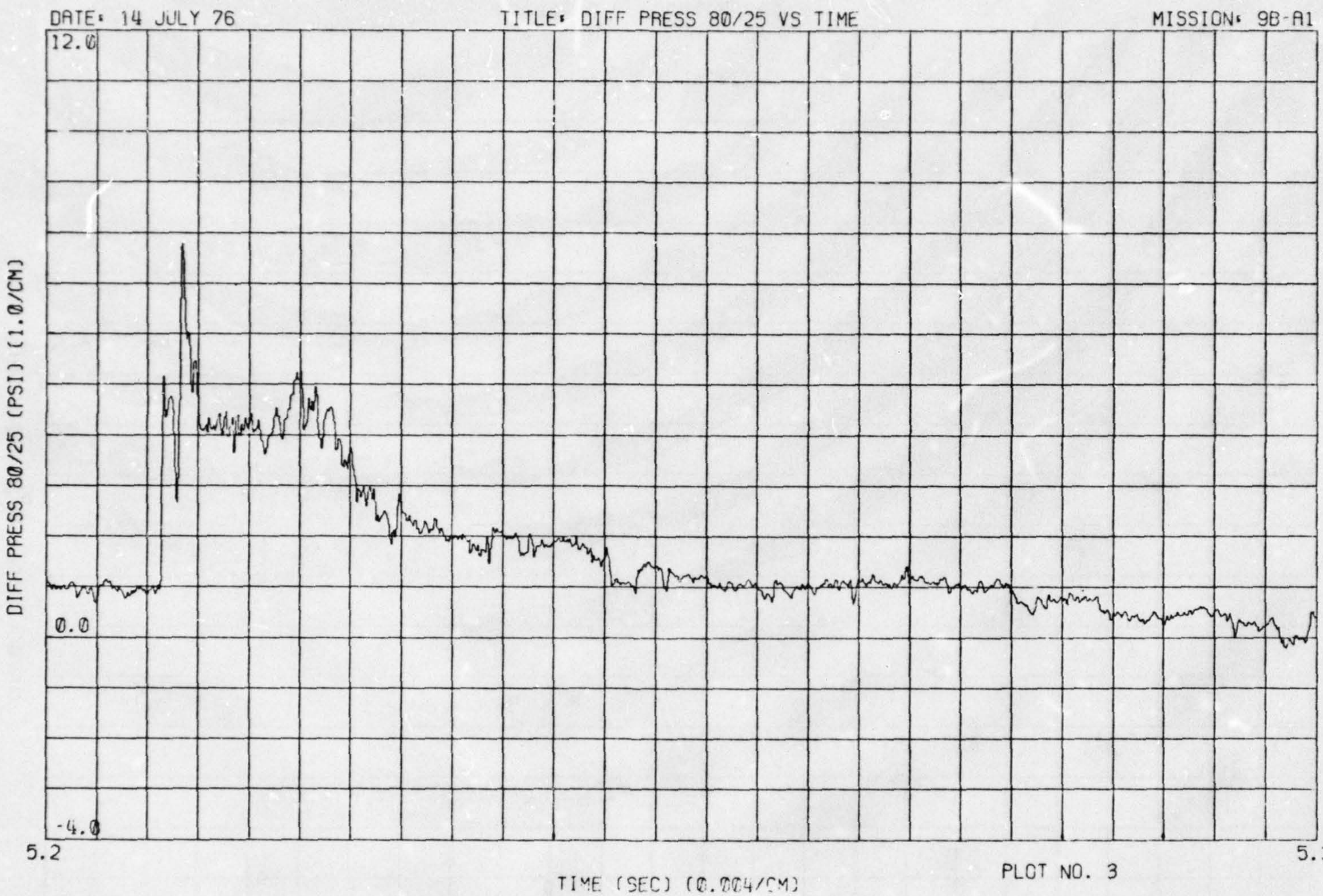


Figure 2. (Continued)

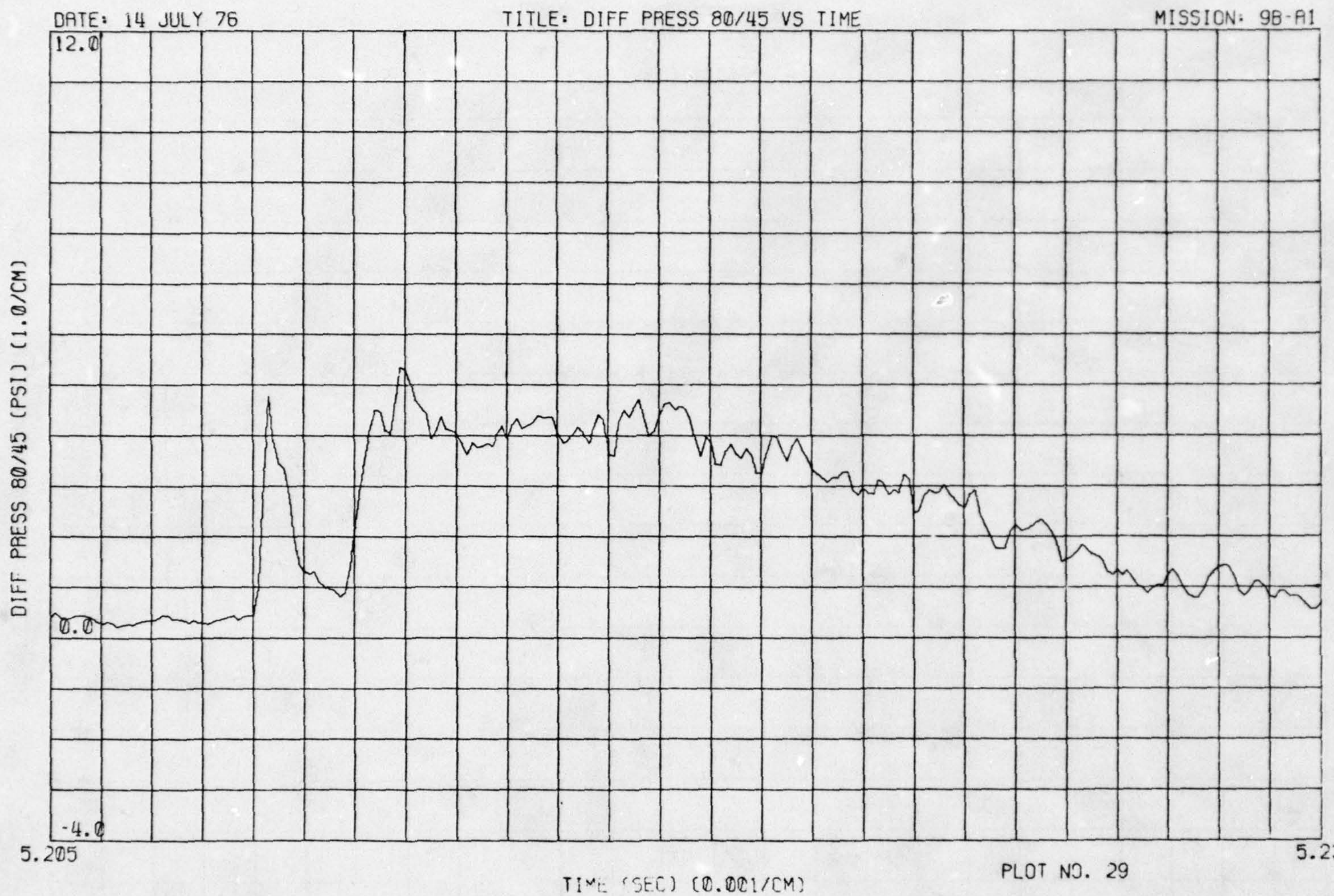


Figure 2. (Continued)

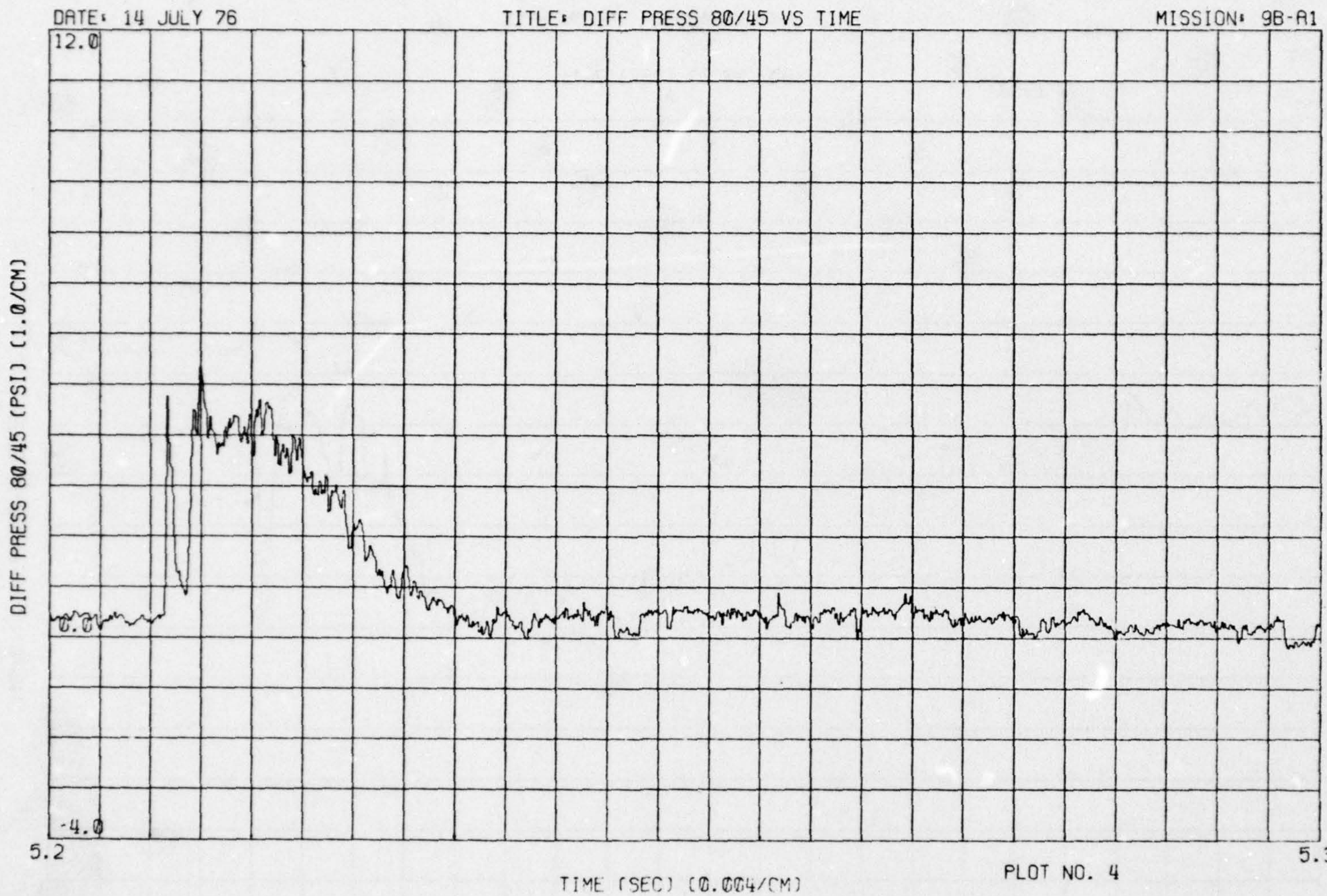


Figure 2. (Continued)

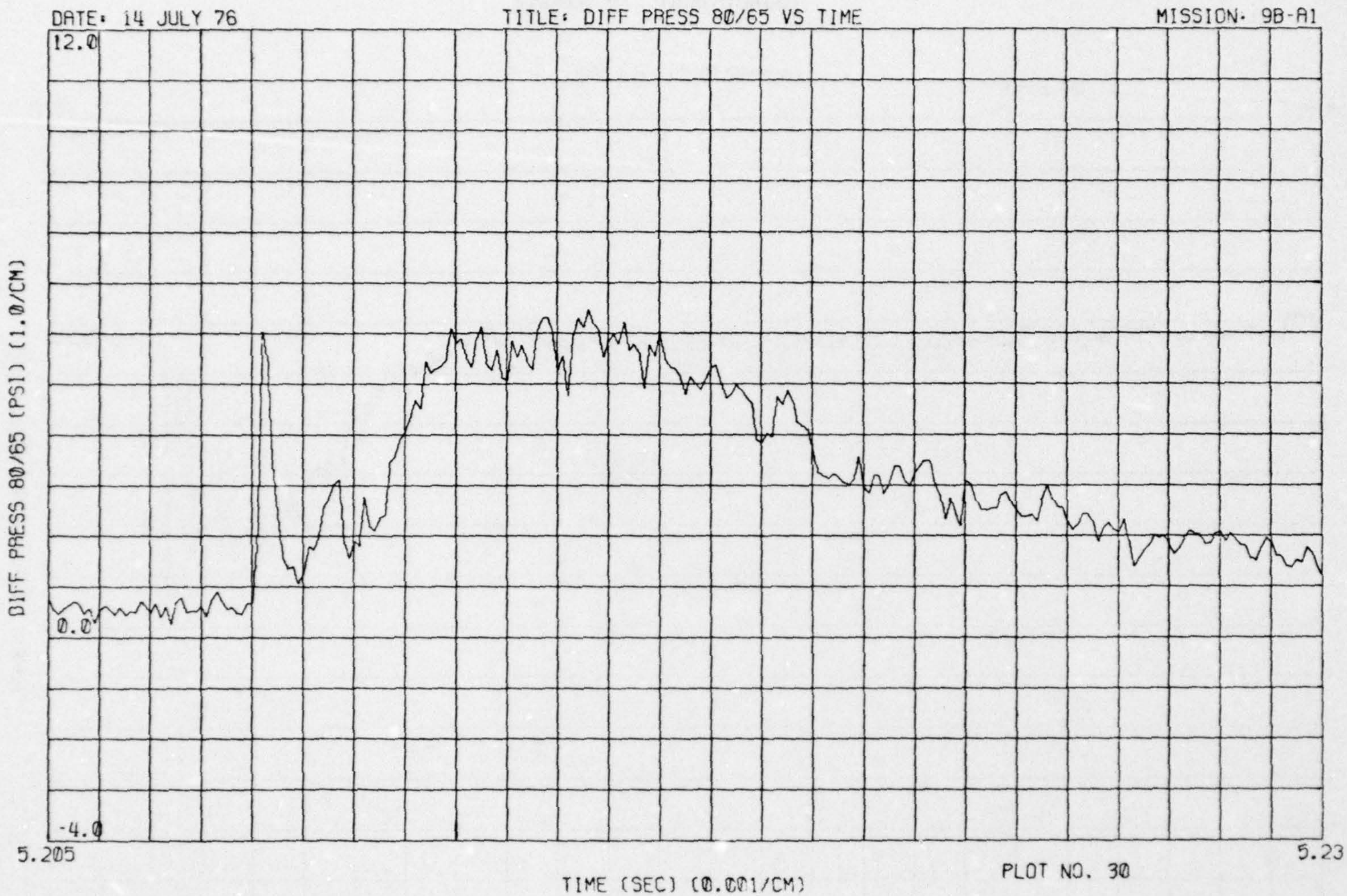


Figure 2. (Continued)

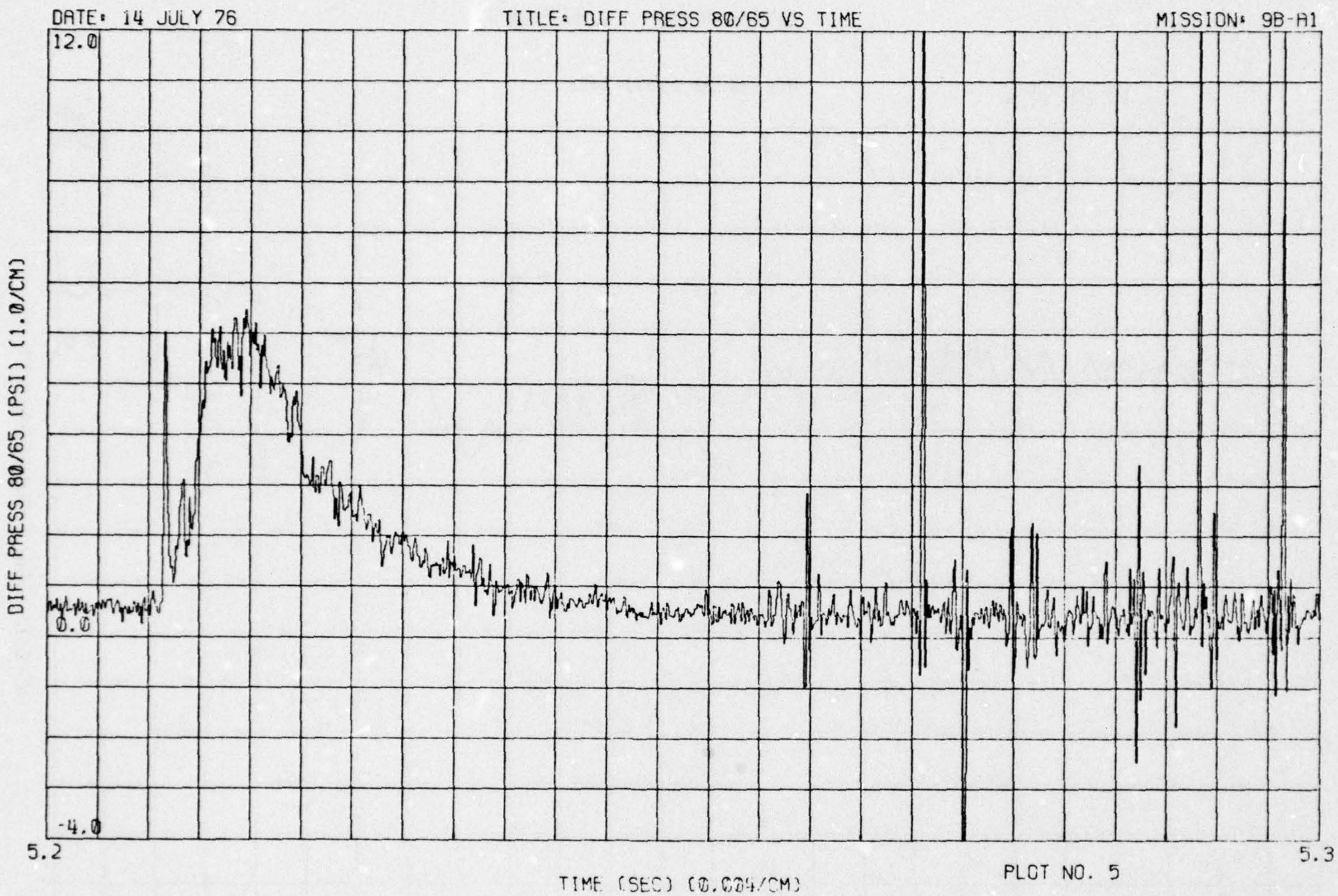


Figure 2. (Continued)

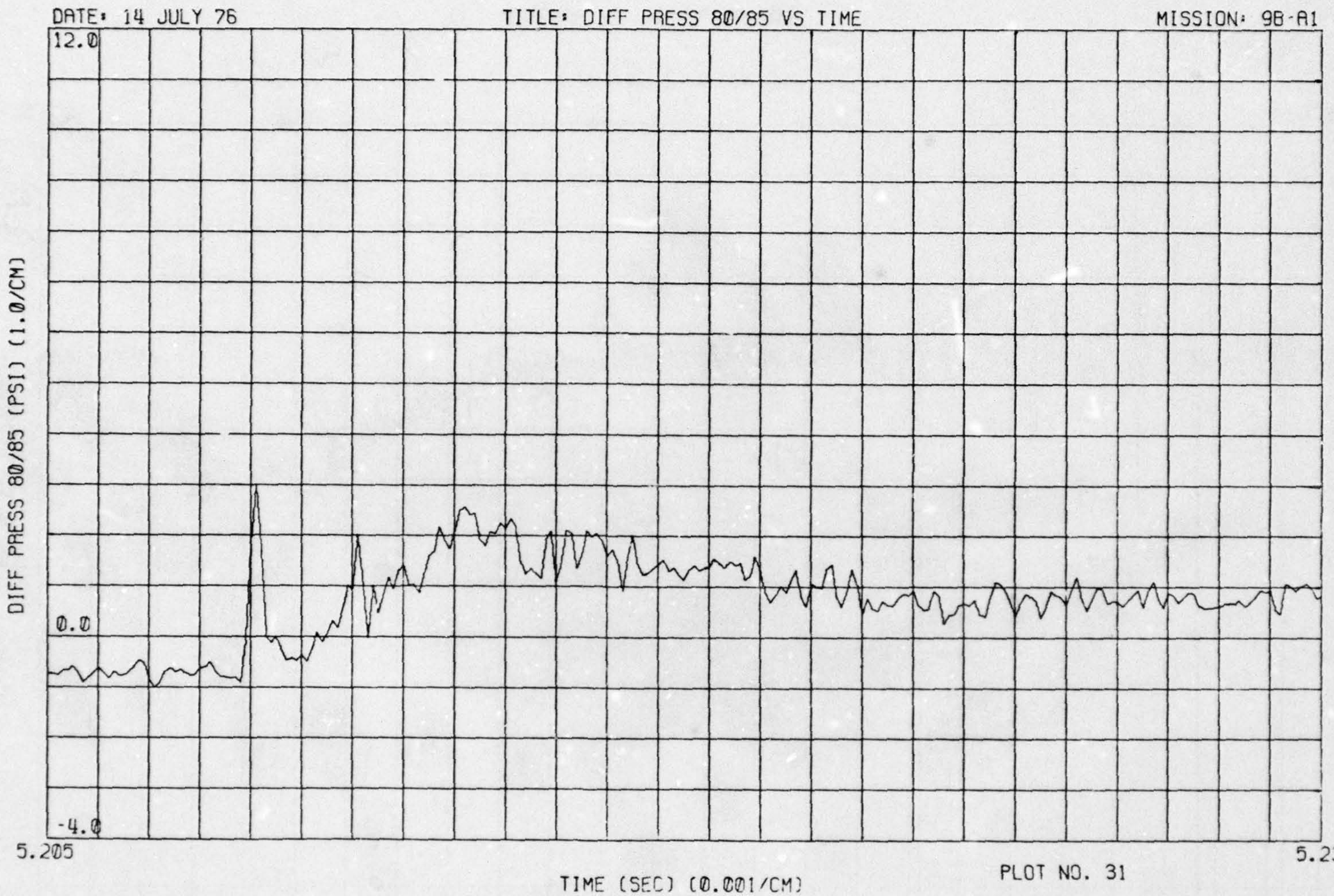


Figure 2. (Continued)

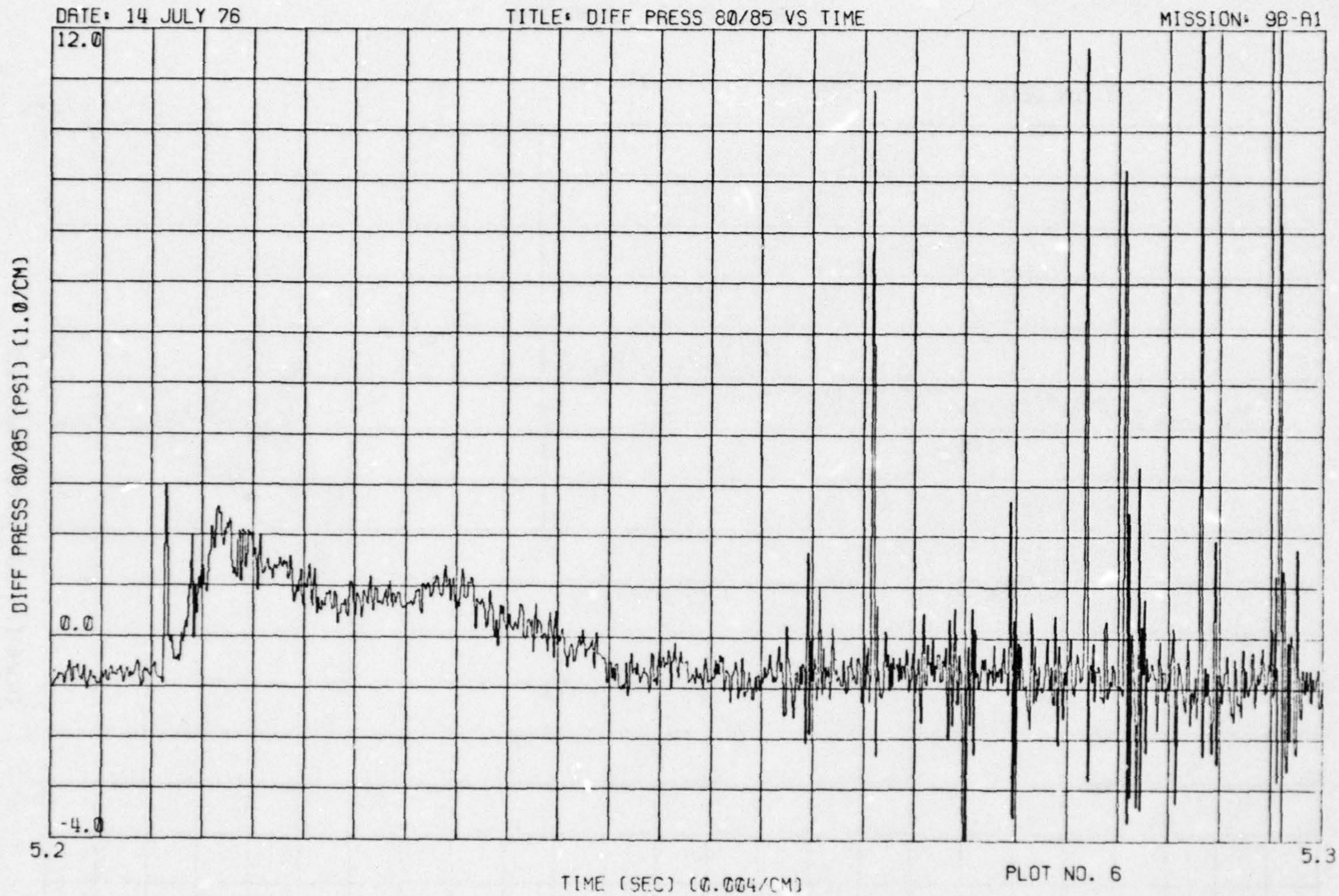


Figure 2. (Continued)

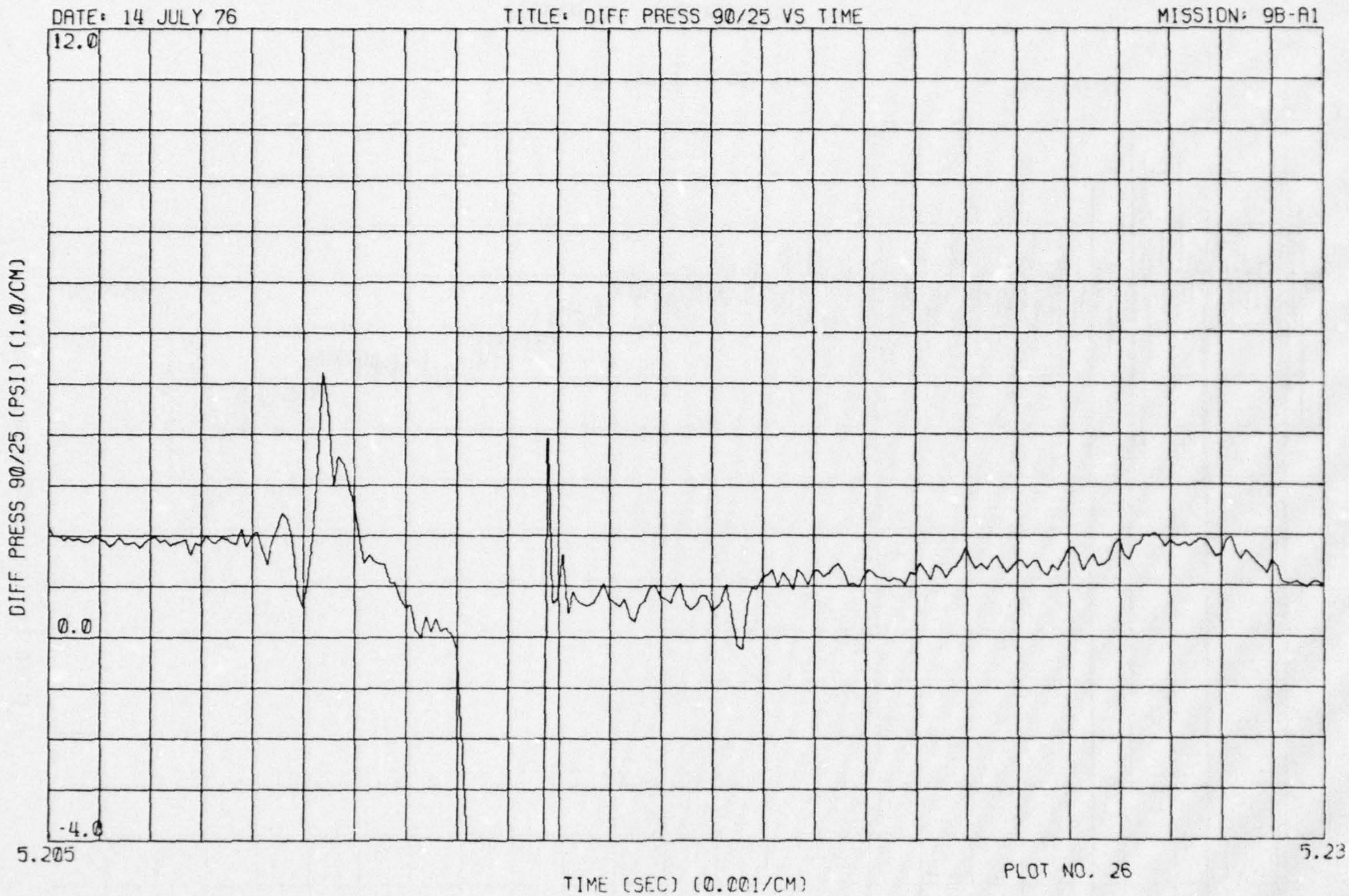


Figure 2. (Continued)

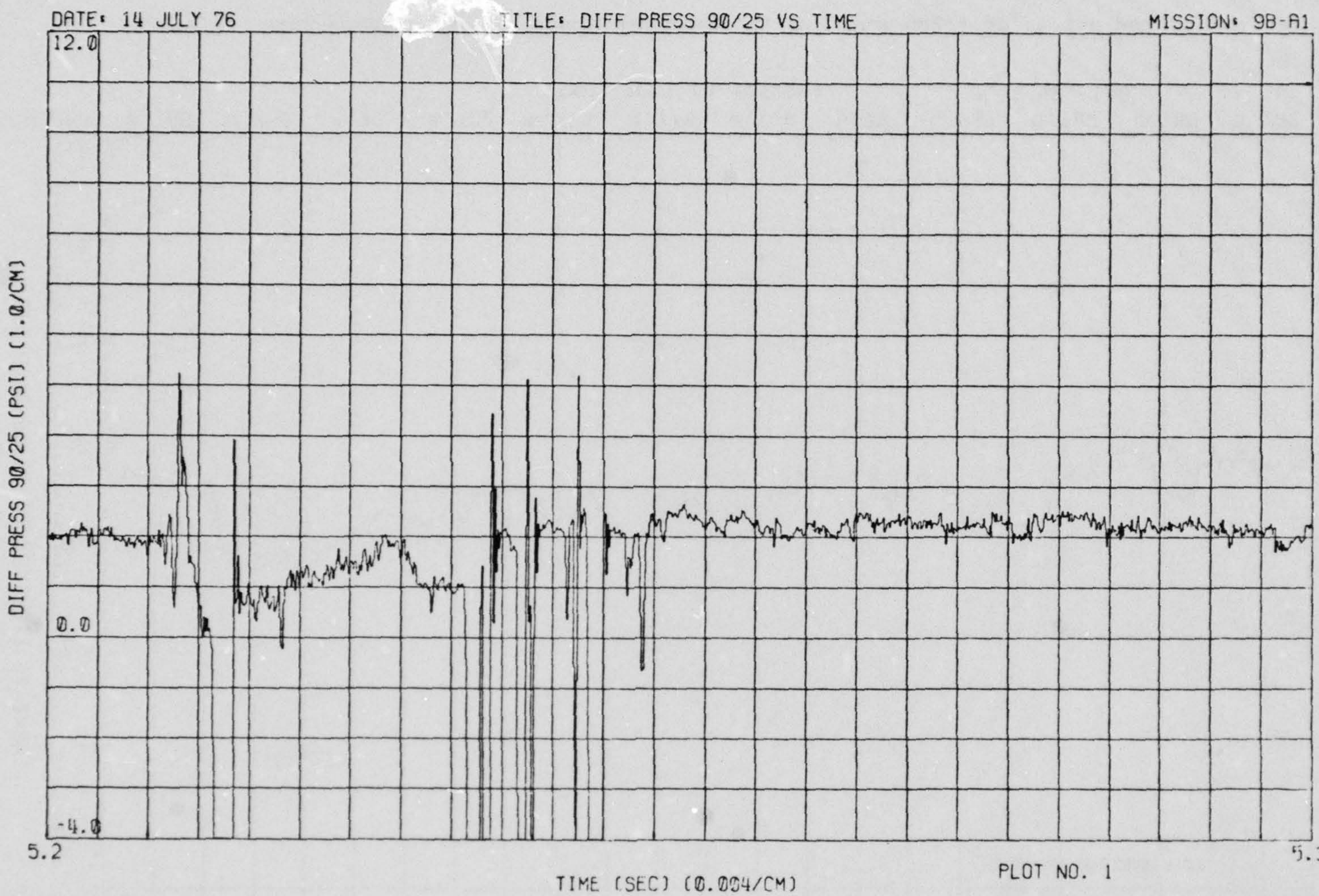


Figure 2. (Concluded)

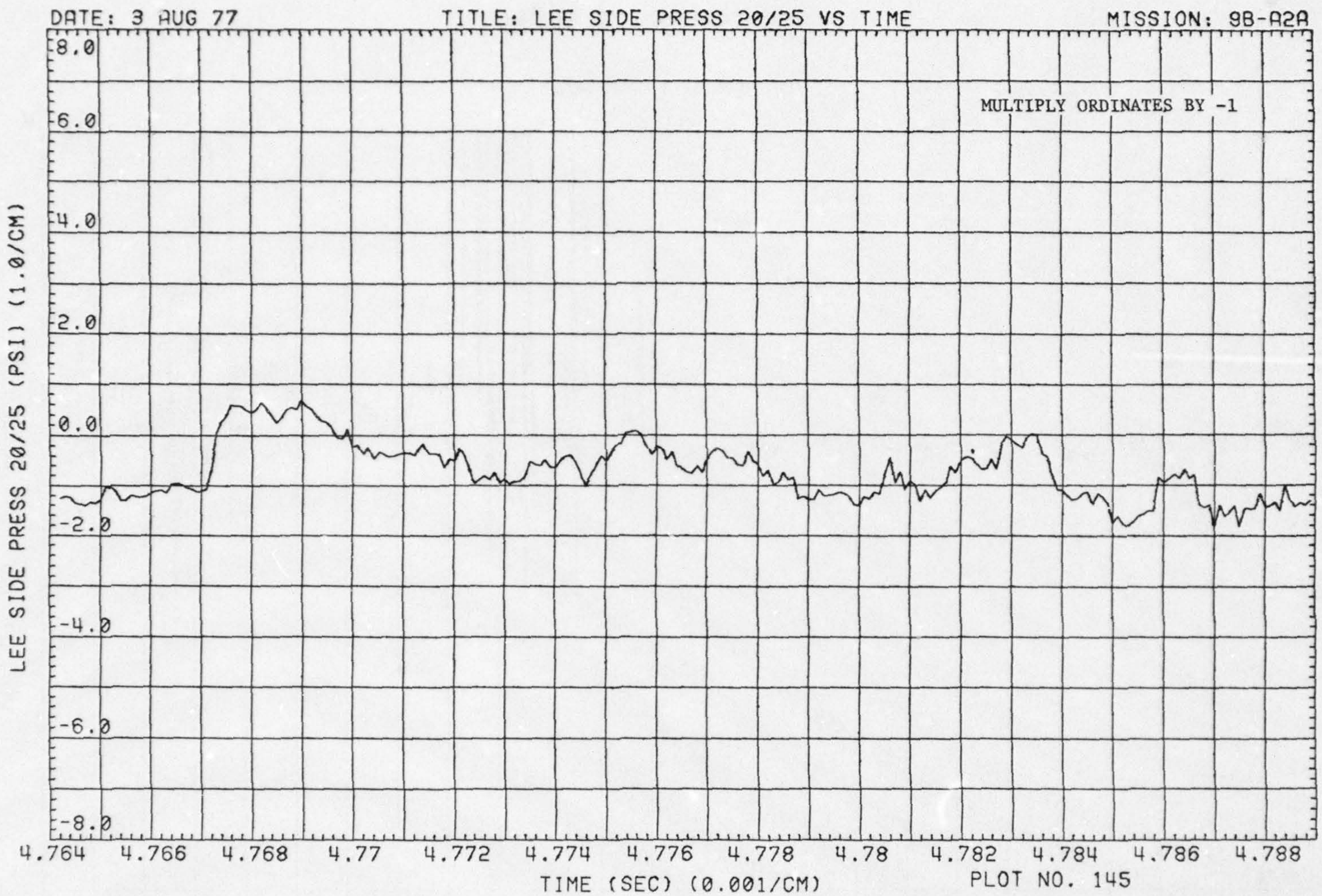


Figure 3. Wing Pressures, Run 9B-A2, Intercept 1, ϕ = 20.1 deg., Δp_s = 2.0 psi.

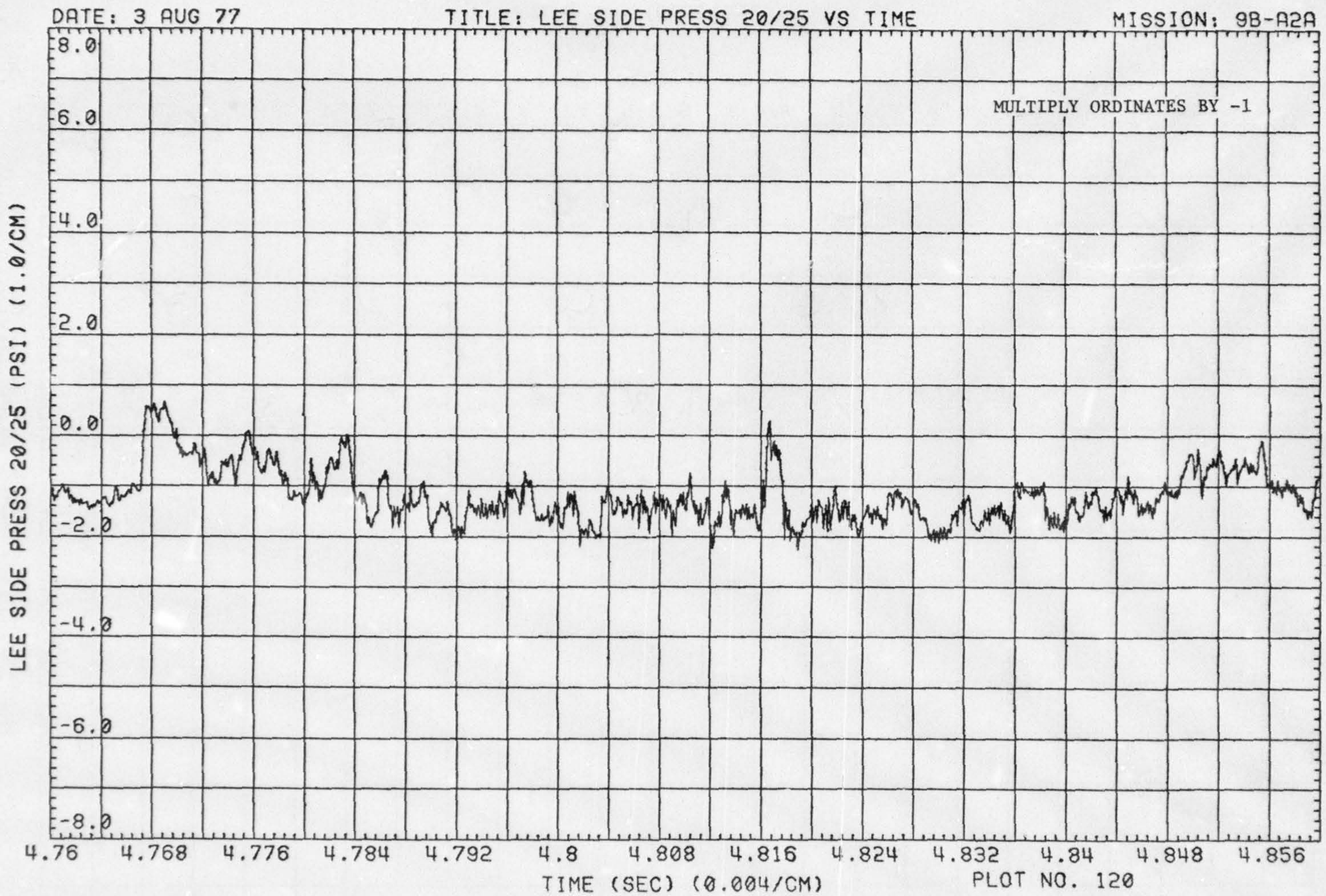


Figure 3. (Continued)

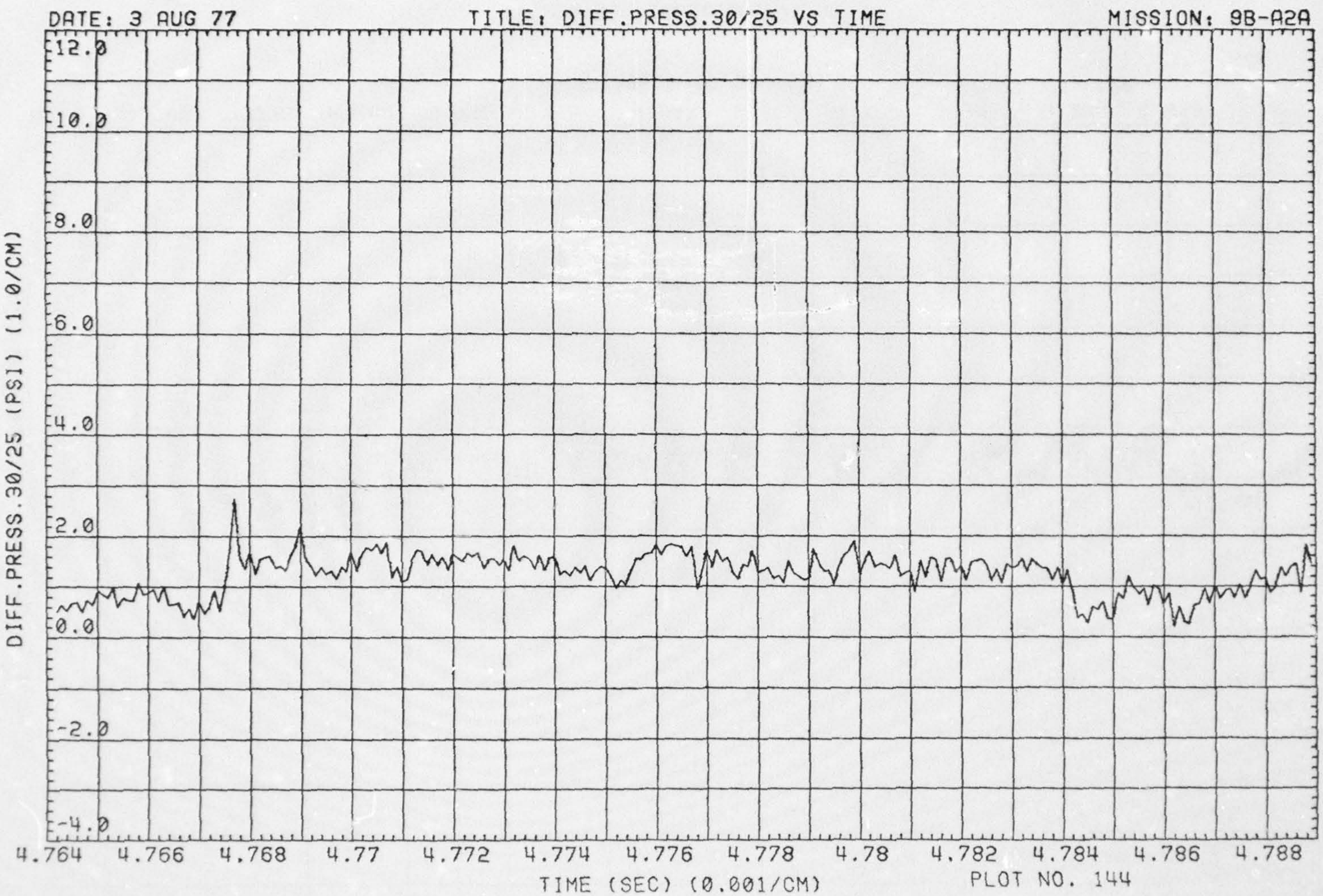


Figure 3. (Continued)

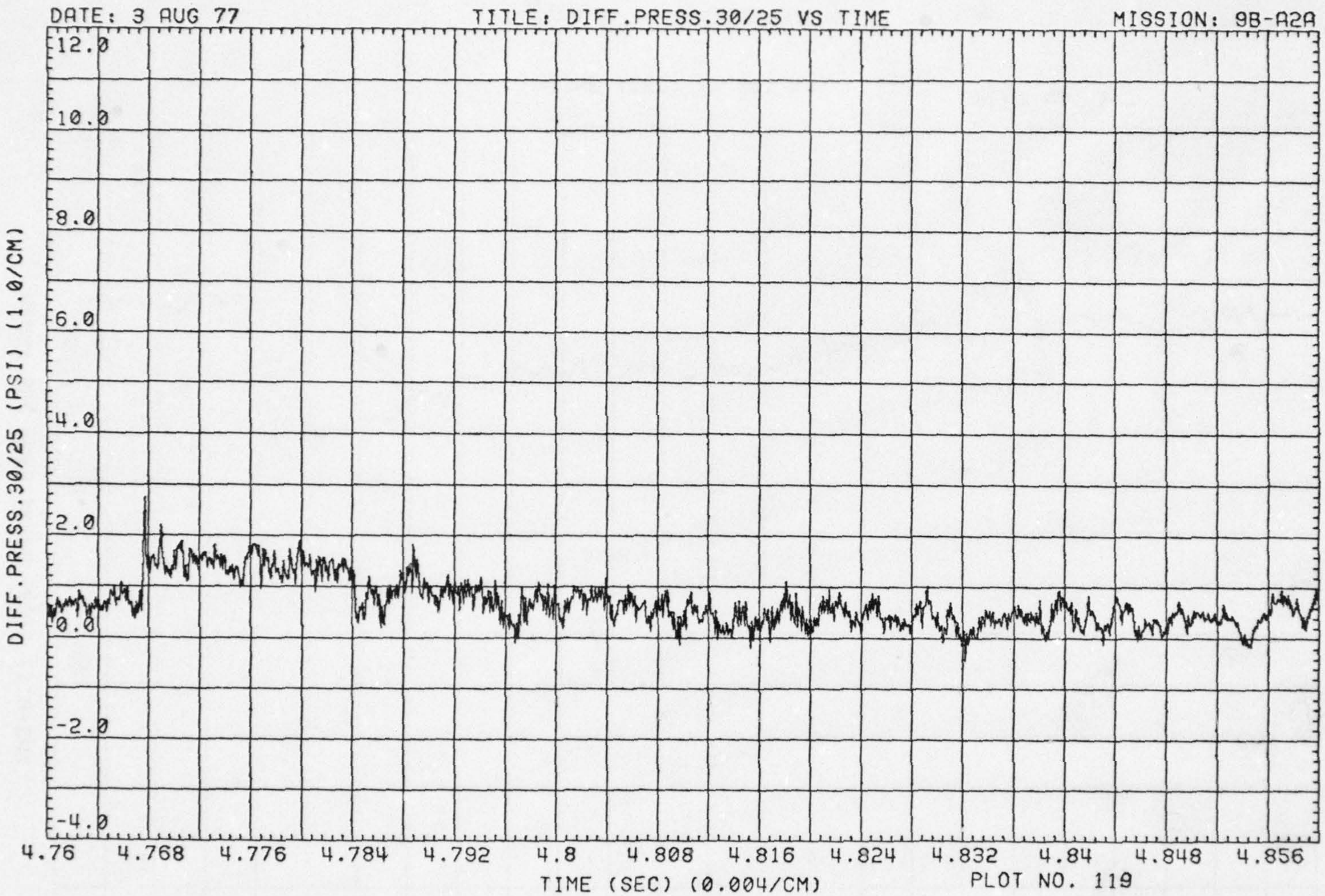


Figure 3. (Continued)

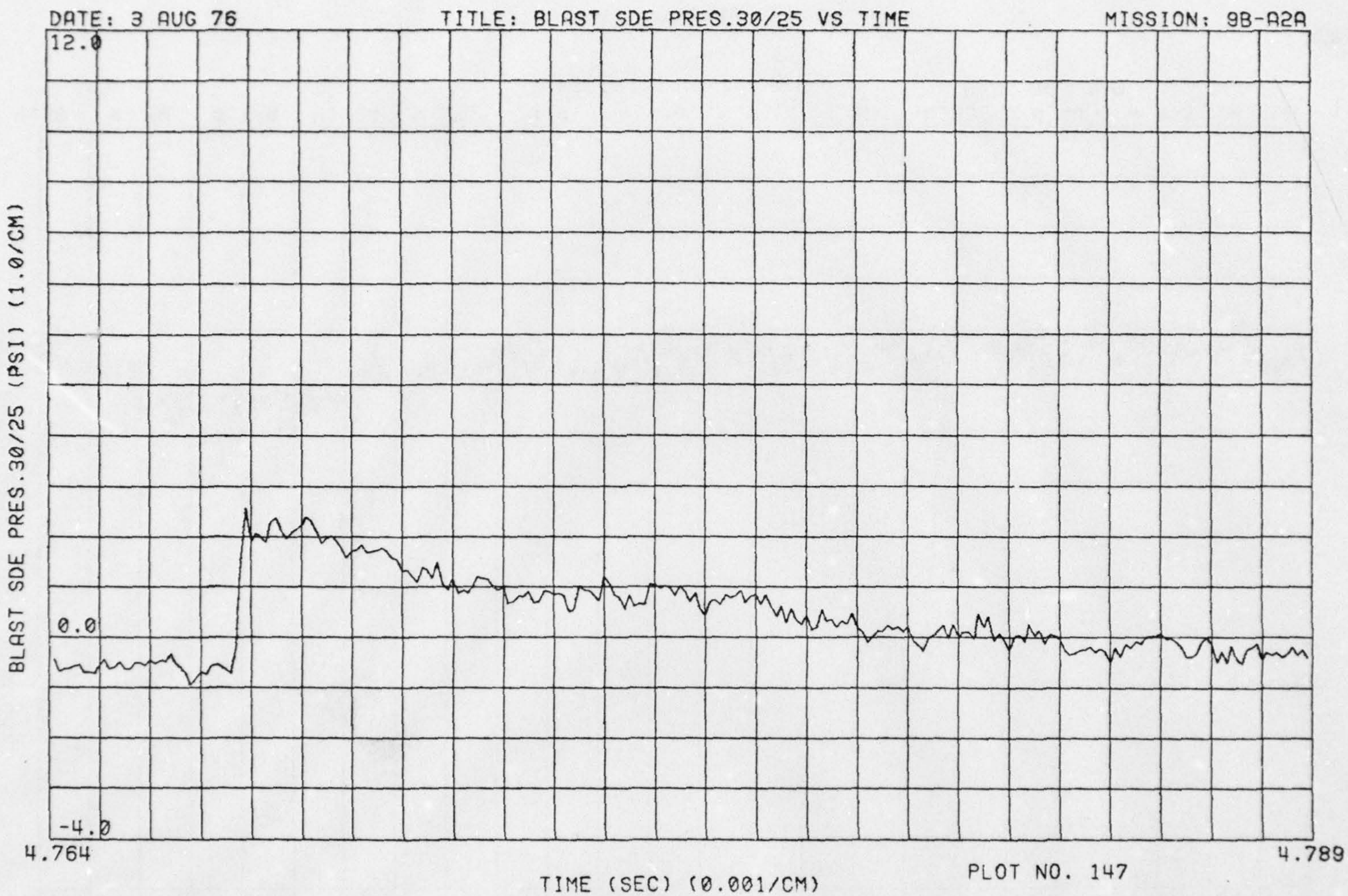


Figure 3. (Continued)

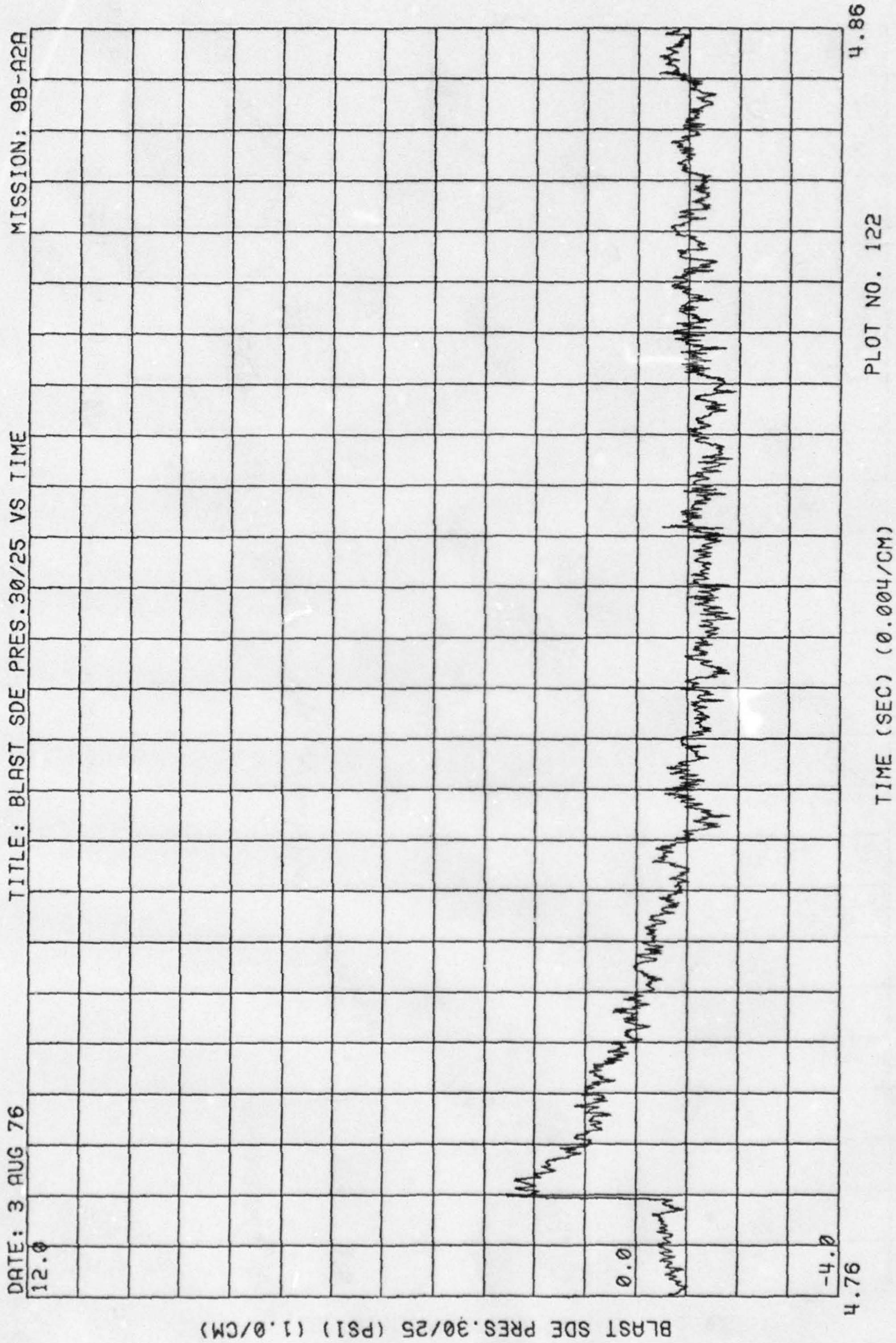


Figure 3. (Continued)

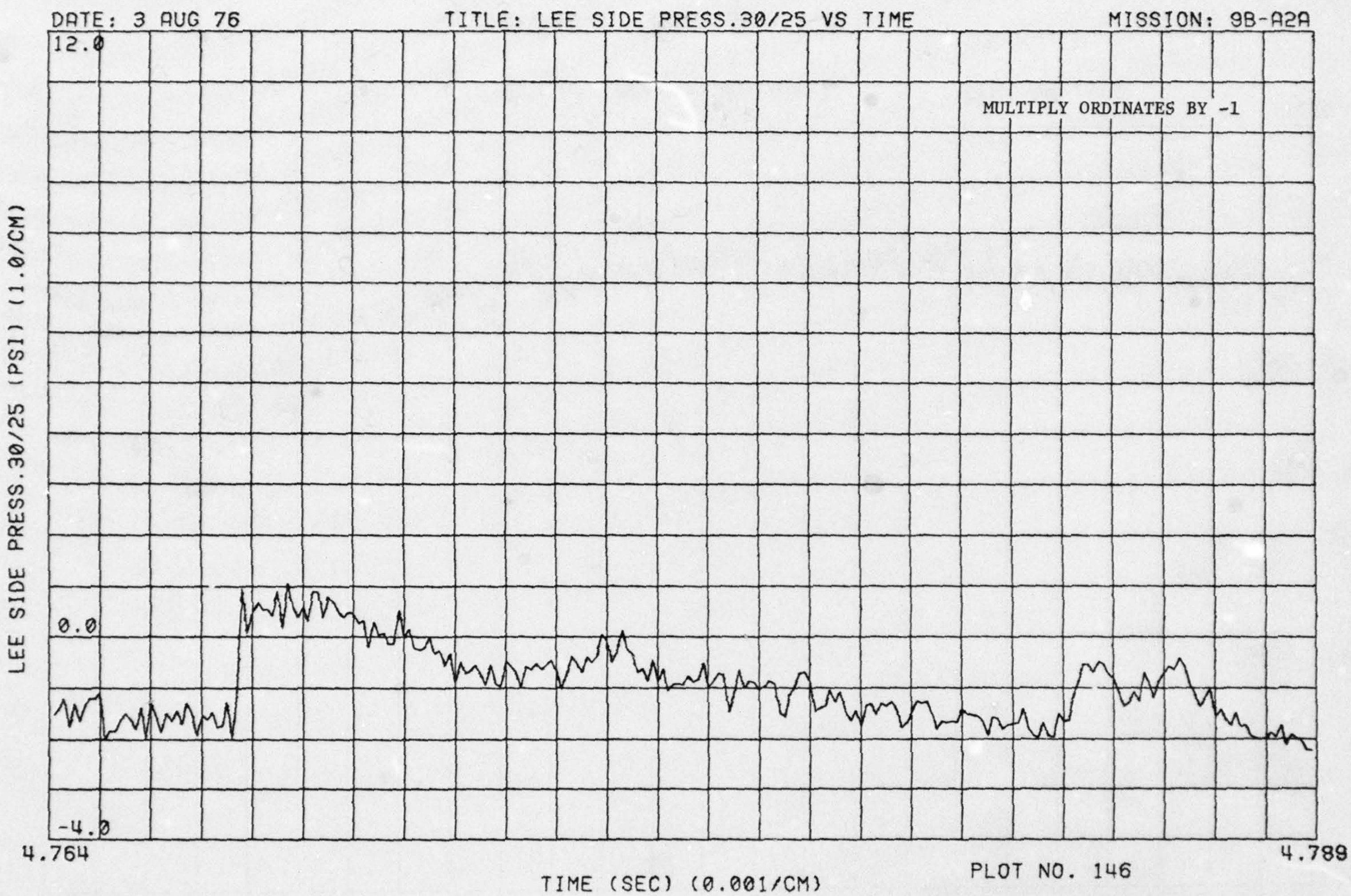


Figure 3. (Continued)

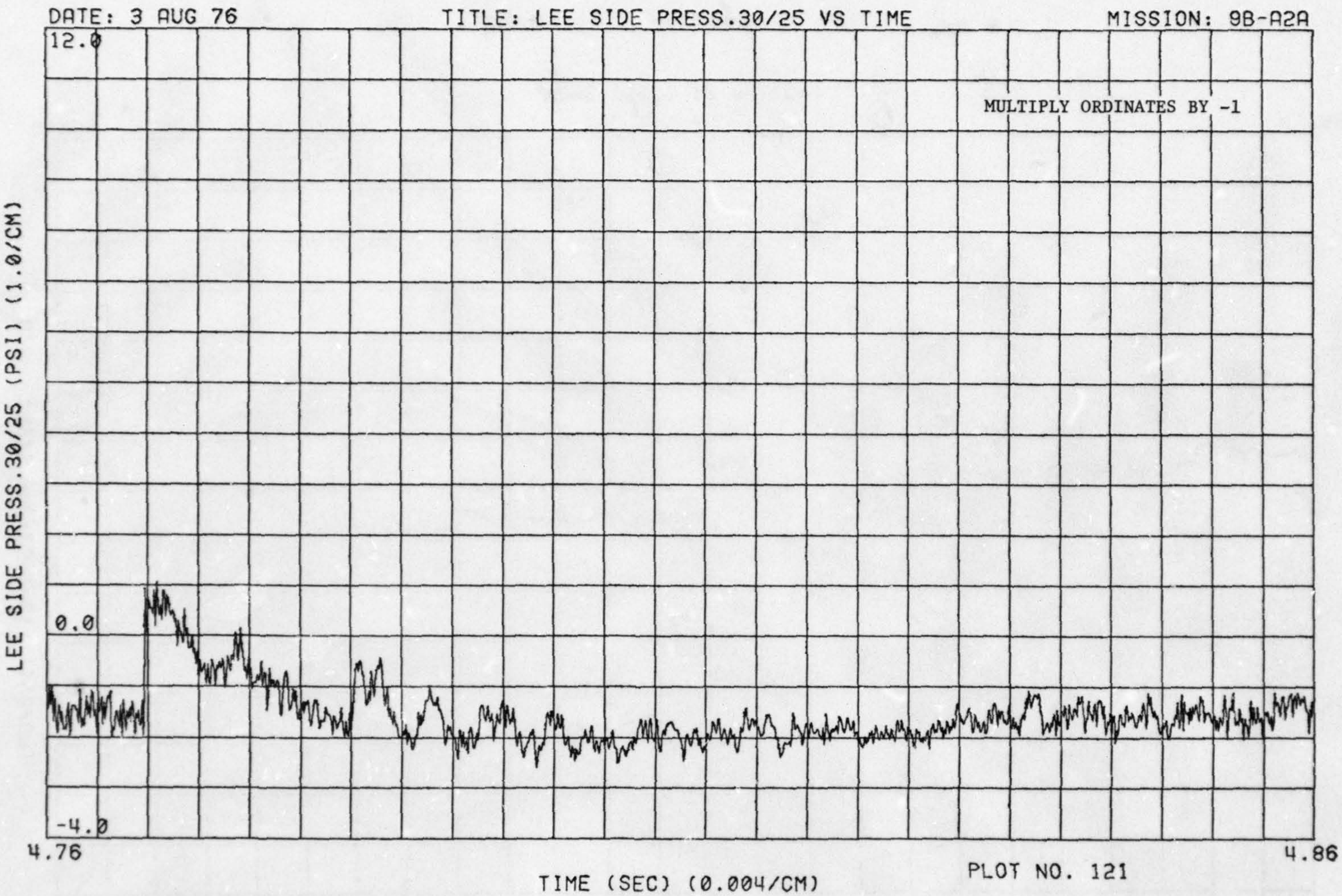


Figure 3. (Continued)

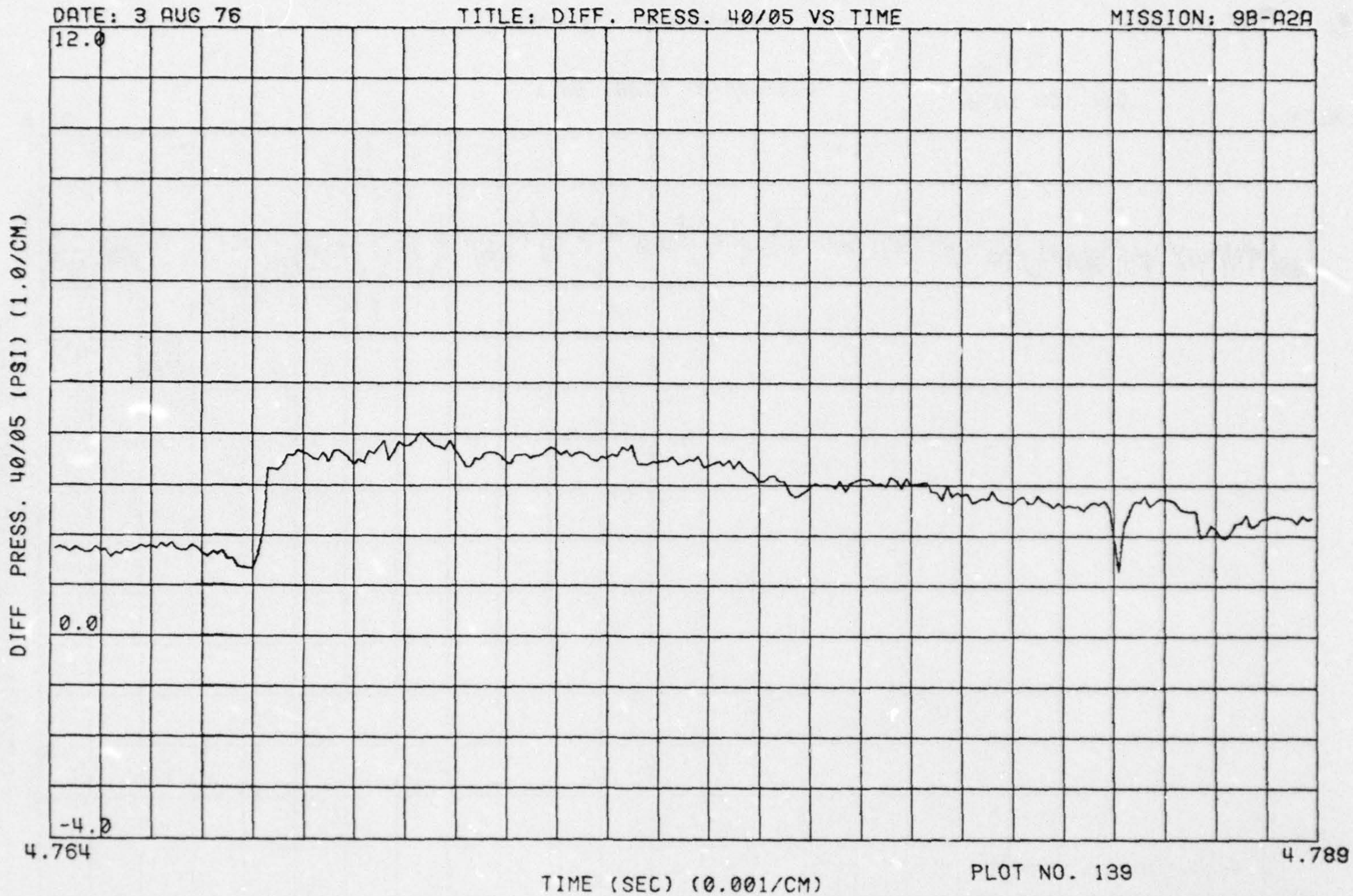


Figure 3. (Continued)

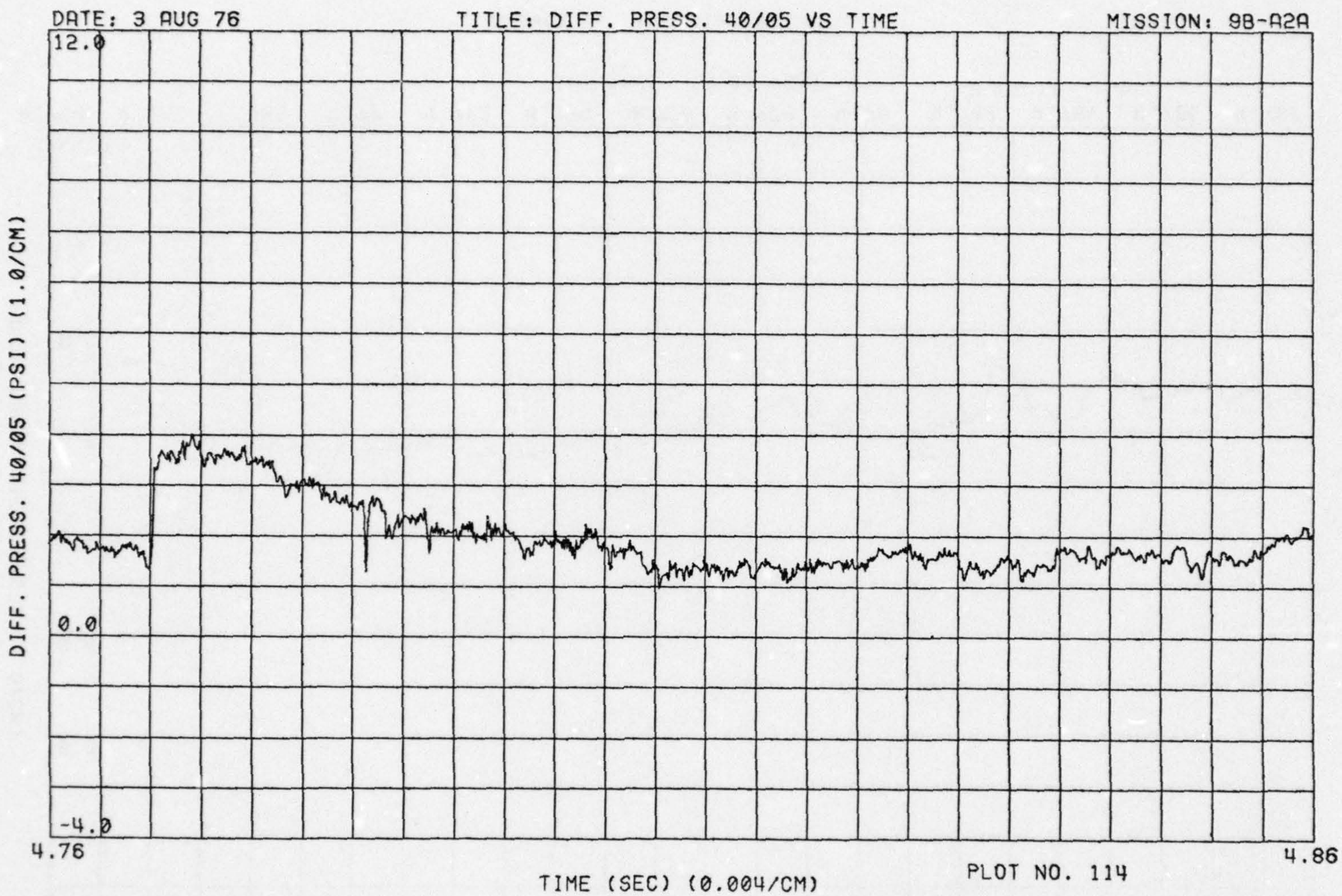


Figure 3. (Continued)

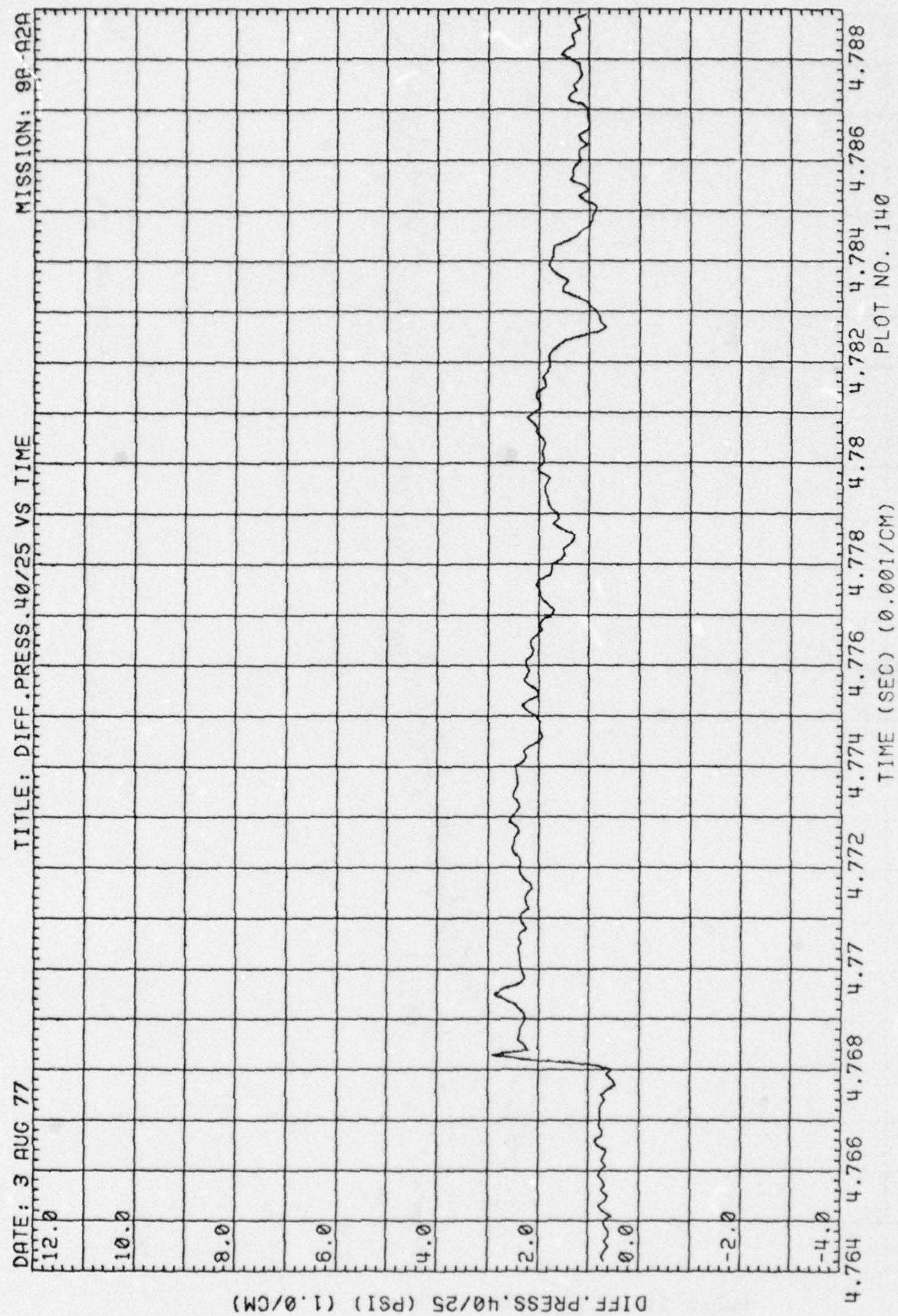


Figure 3. (Continued)

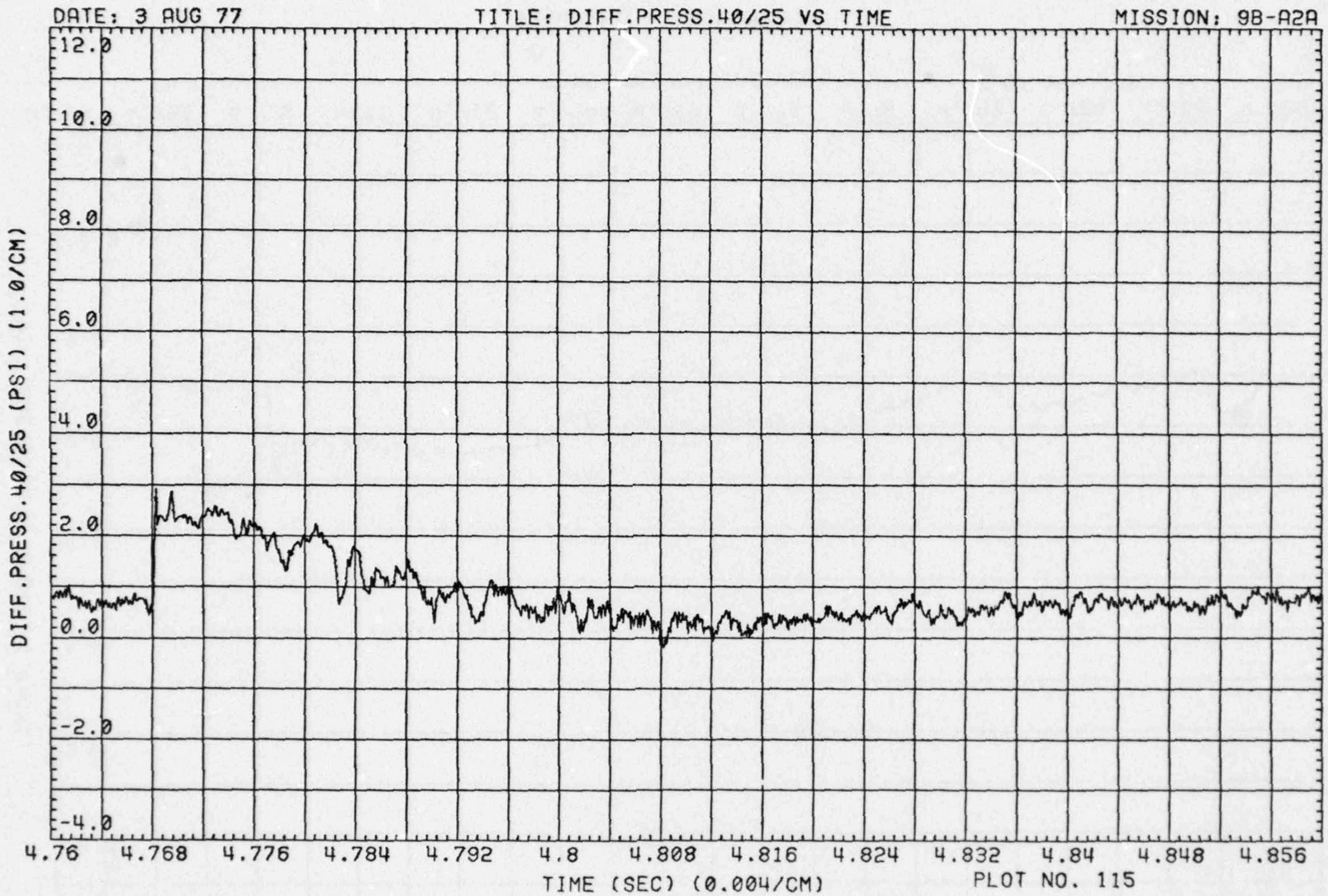


Figure 3. (Continued)

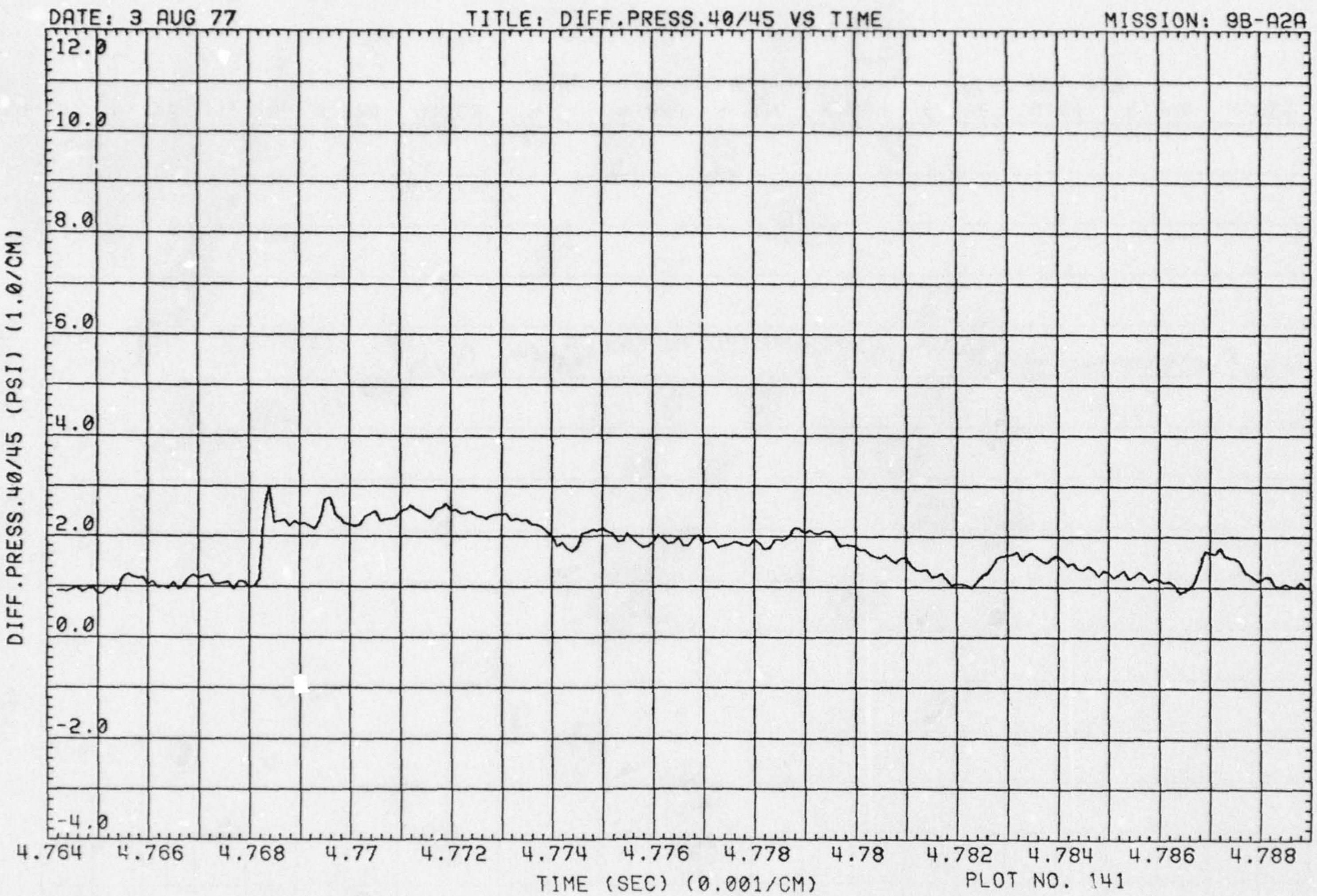


Figure 3. (Continued)

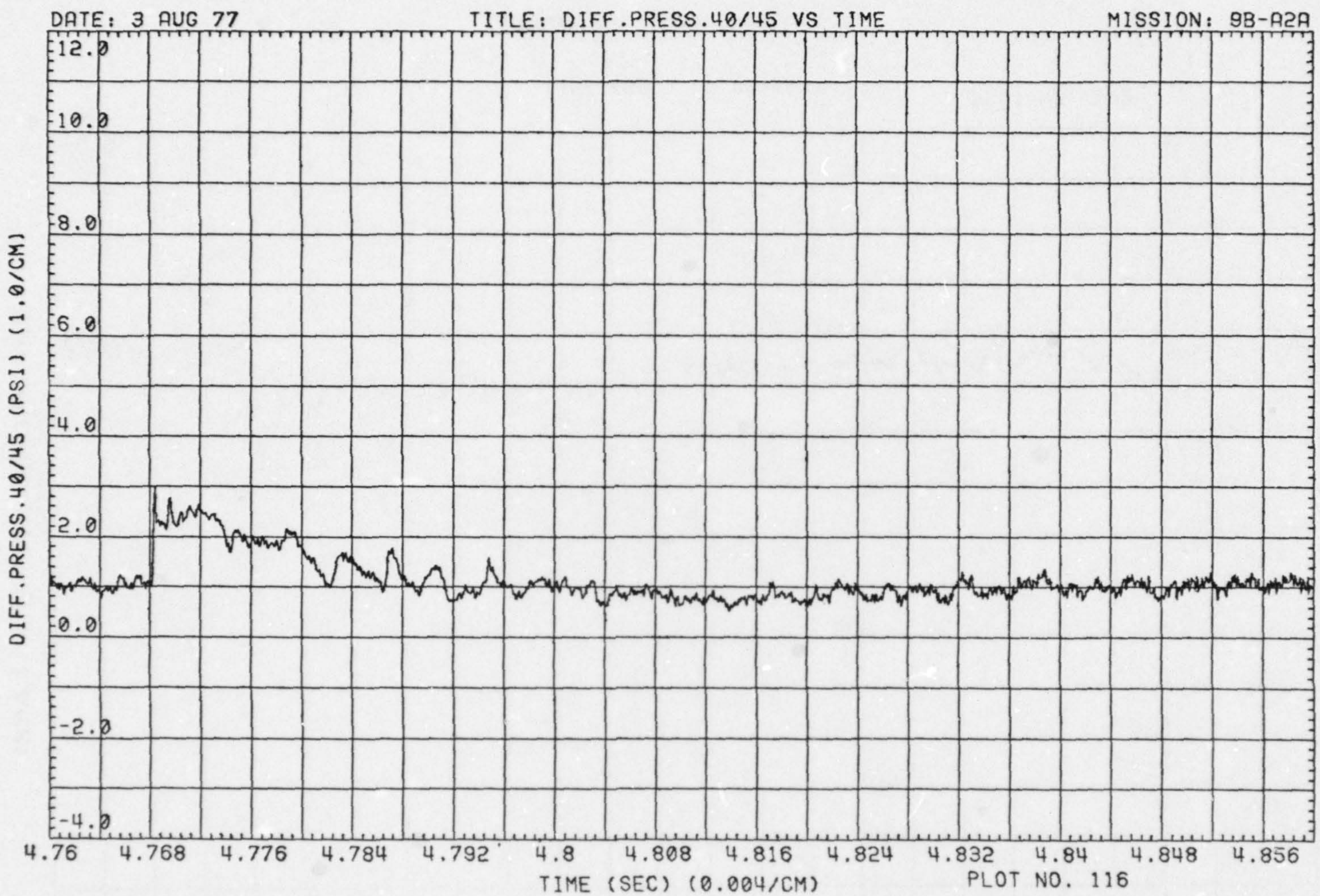


Figure 3. (Continued)

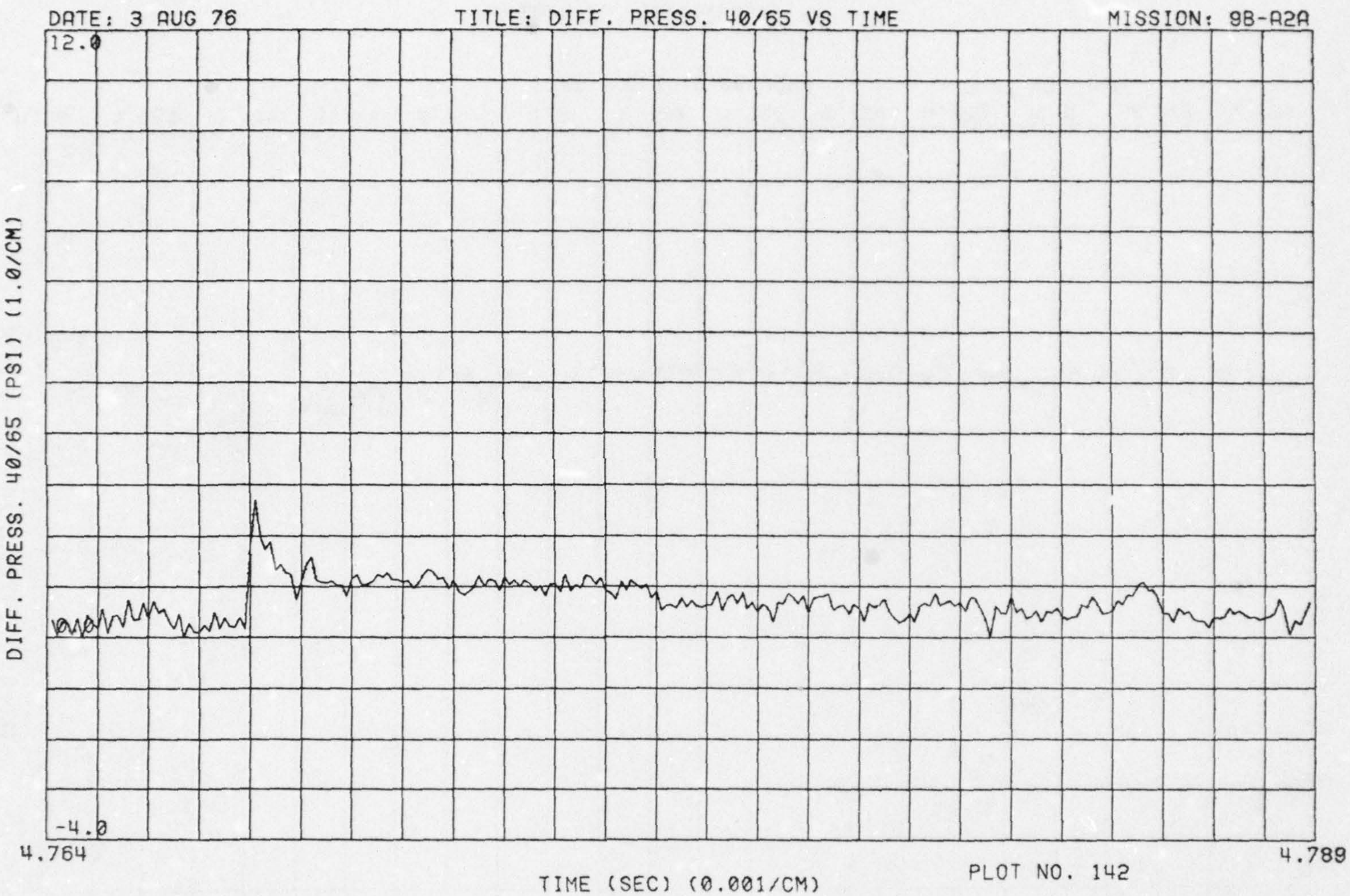


Figure 3. (Continued)

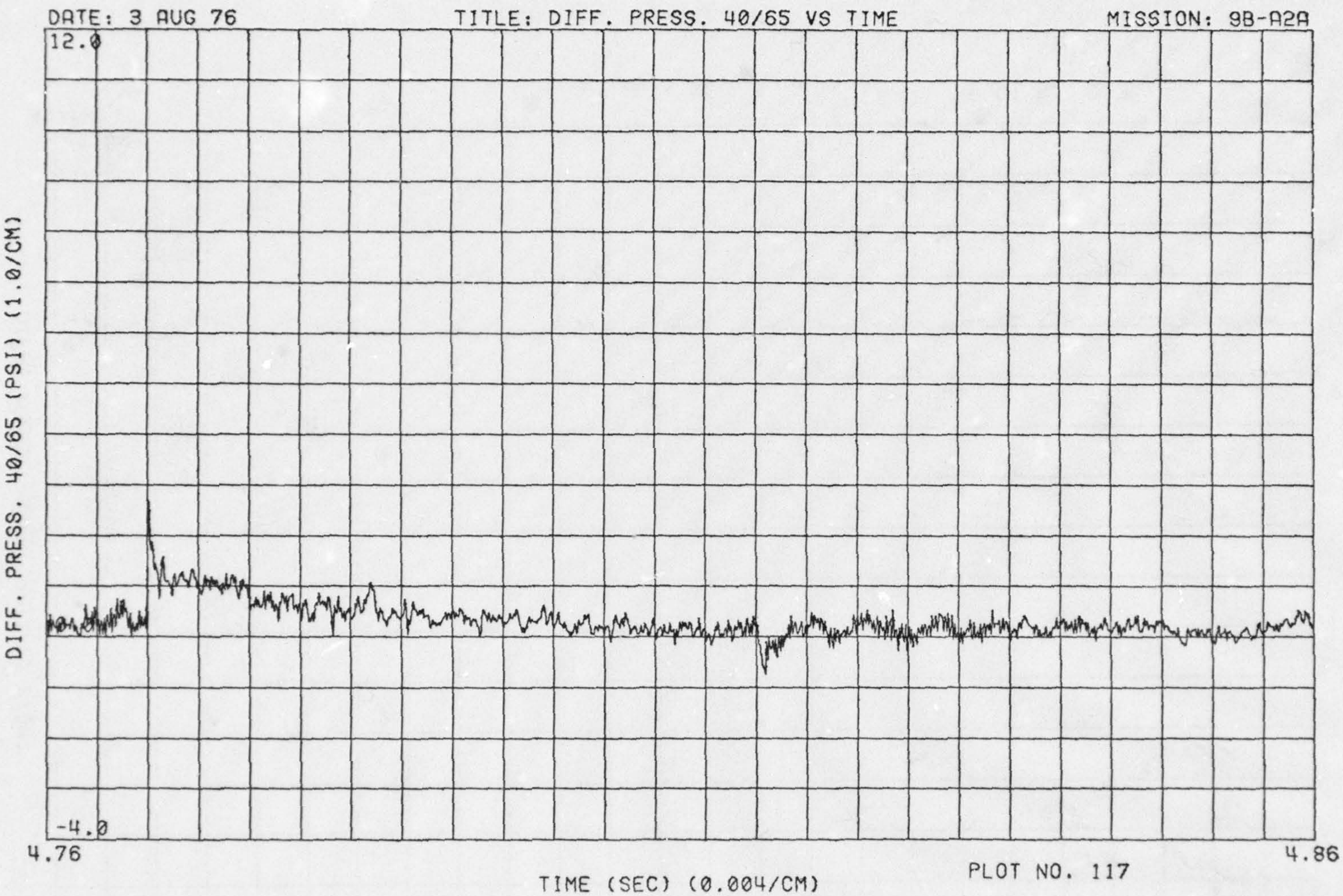


Figure 3. (Continued)

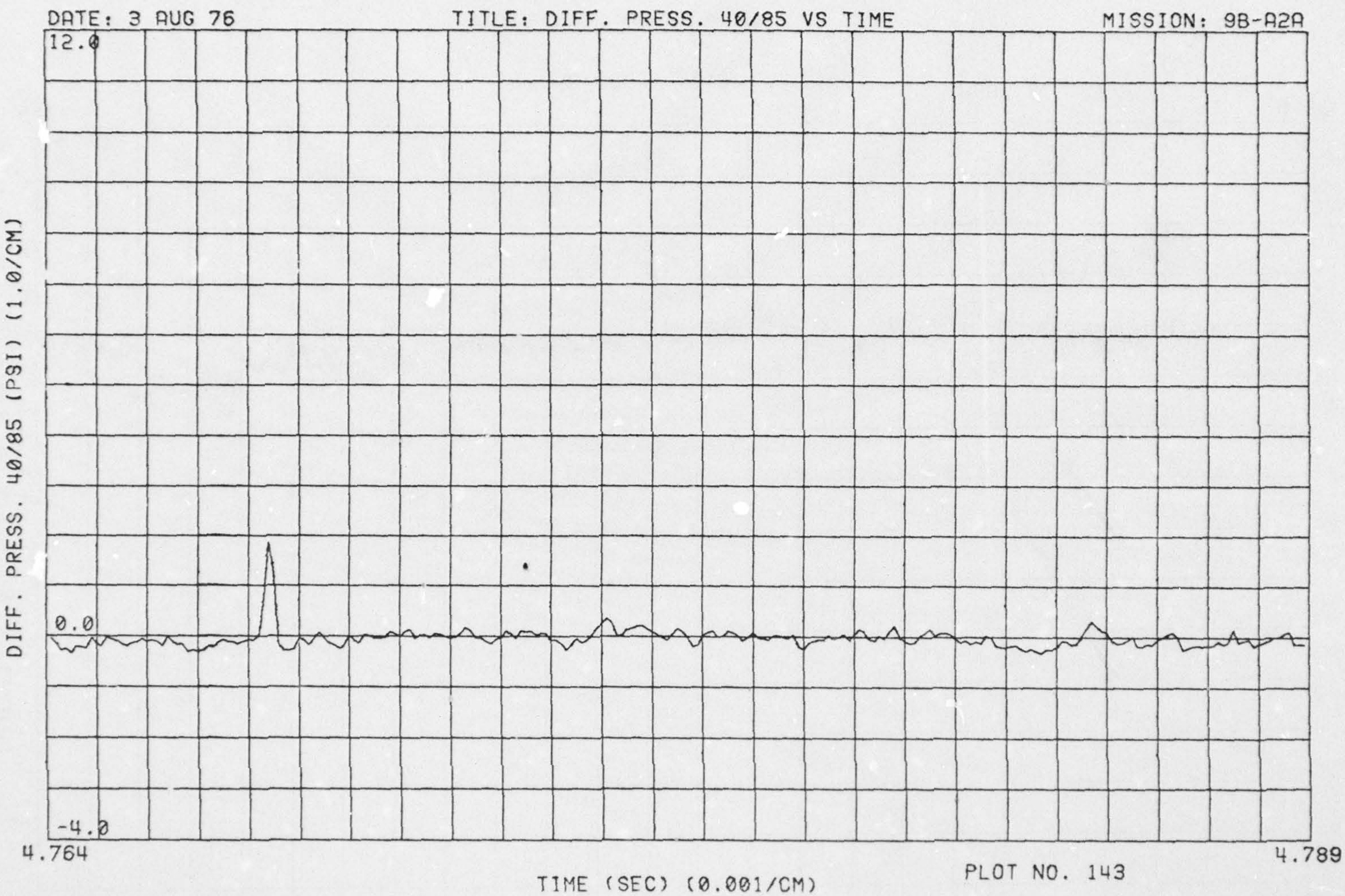


Figure 3. (Continued)

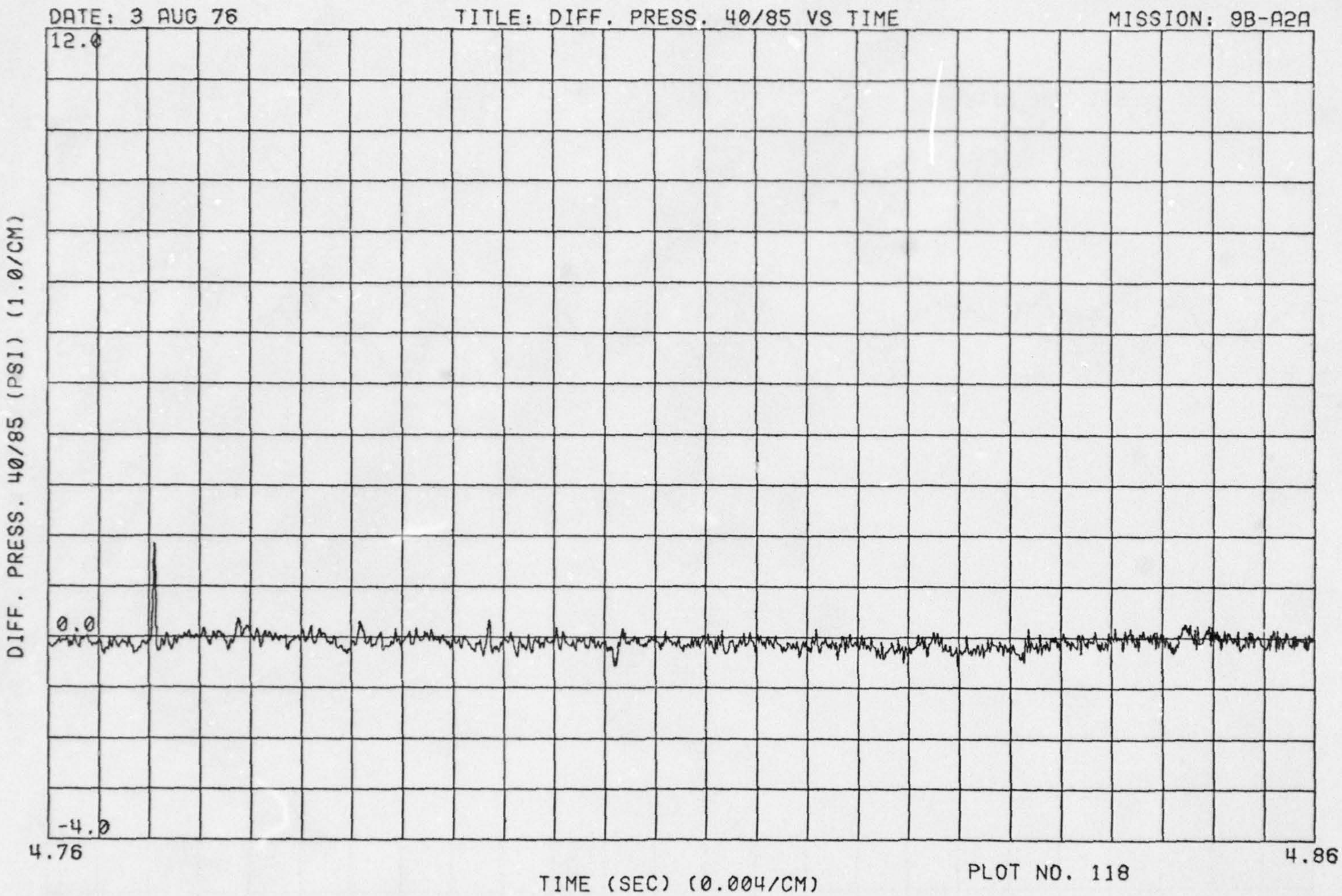


Figure 3. (Continued)

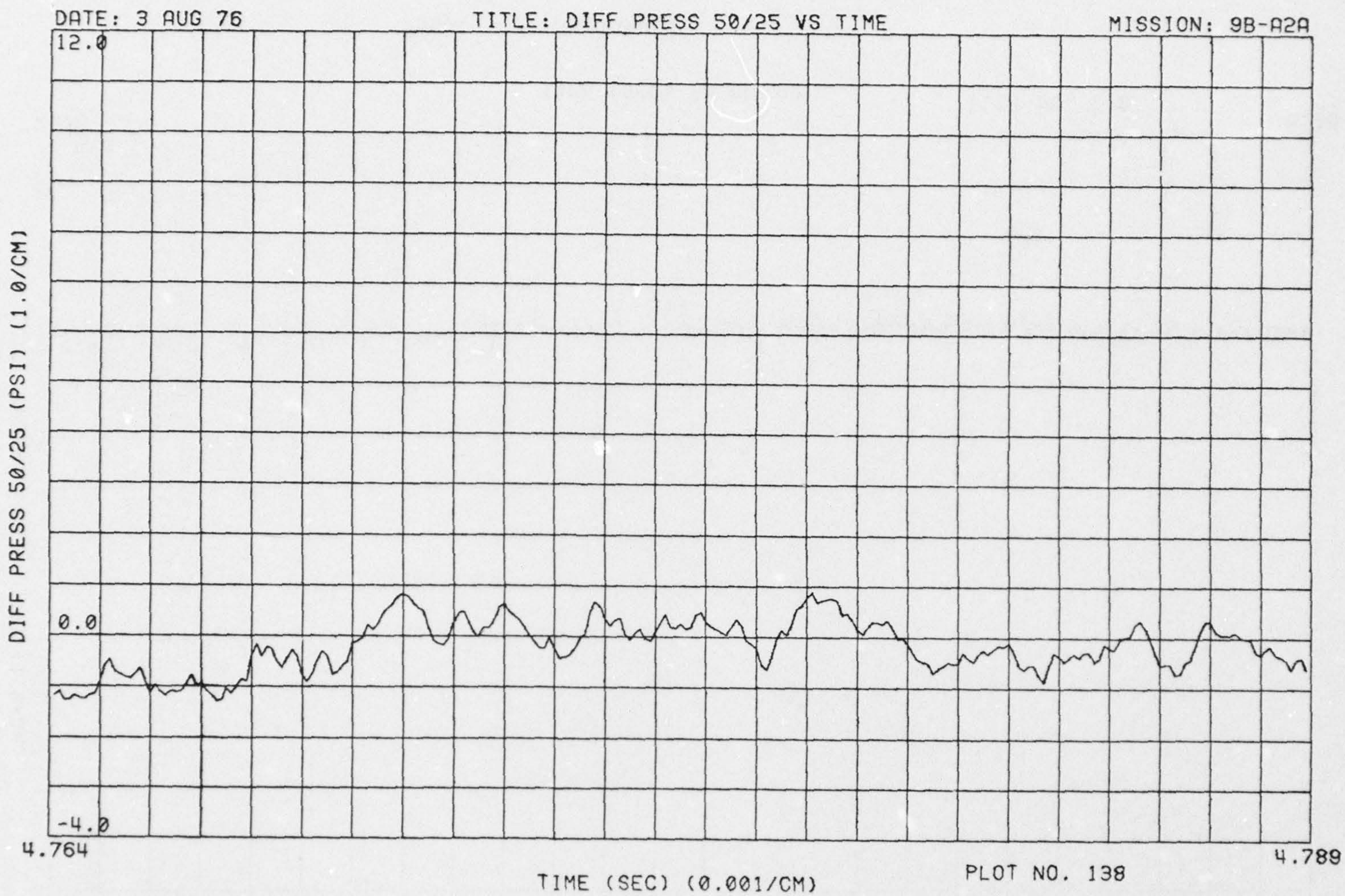


Figure 3. (Continued)

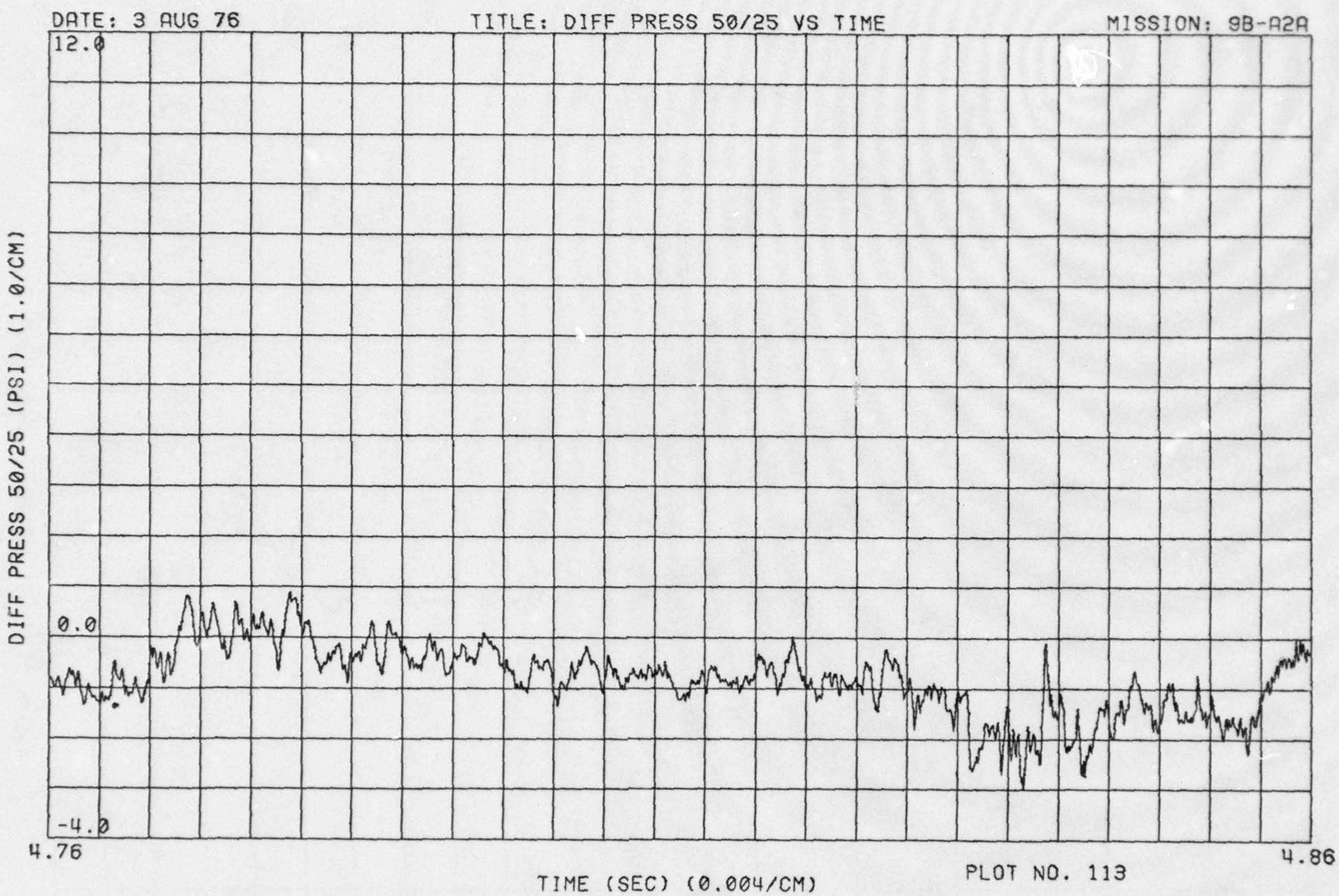


Figure 3. (Continued)

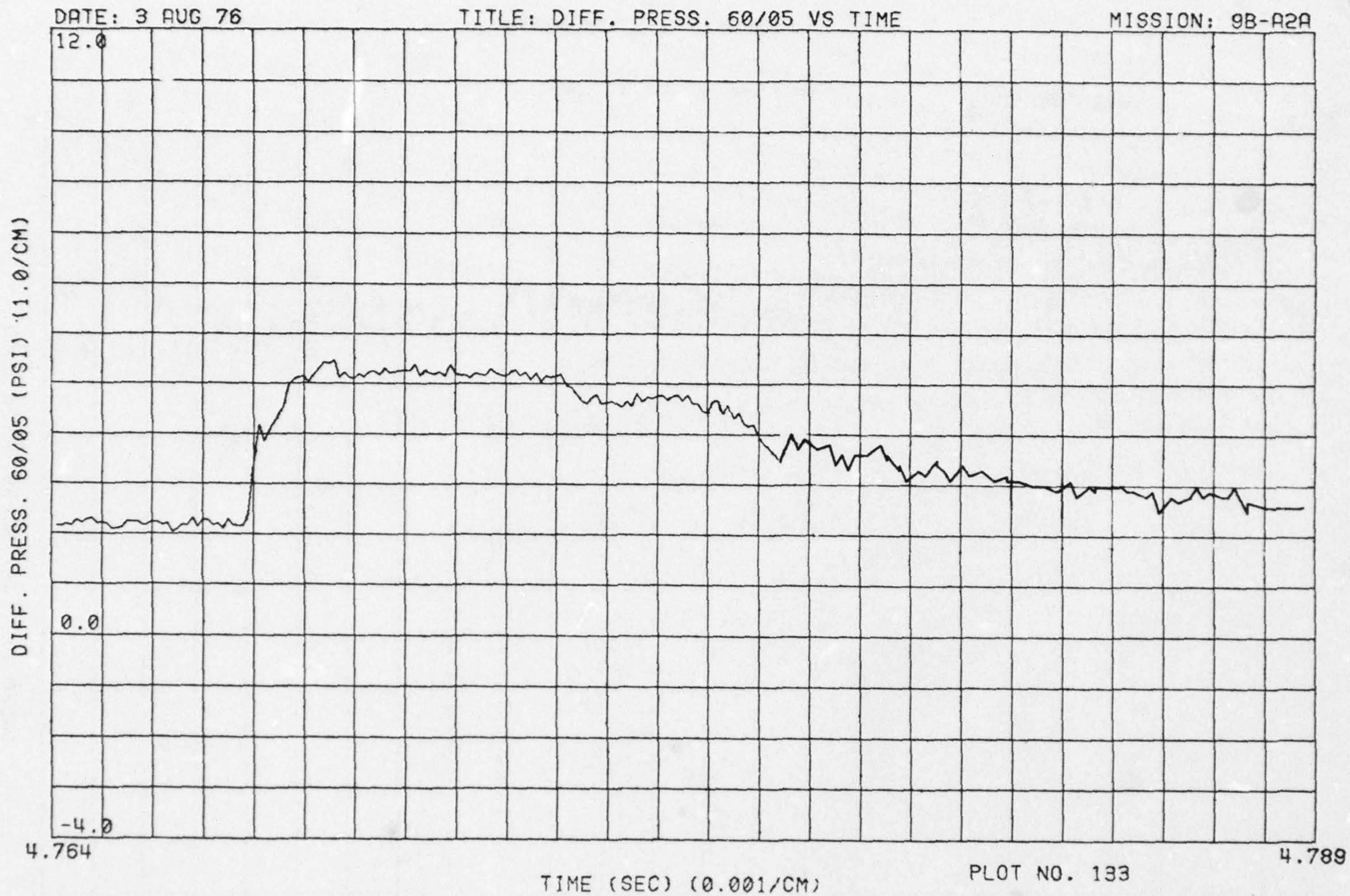


Figure 3. (Continued)

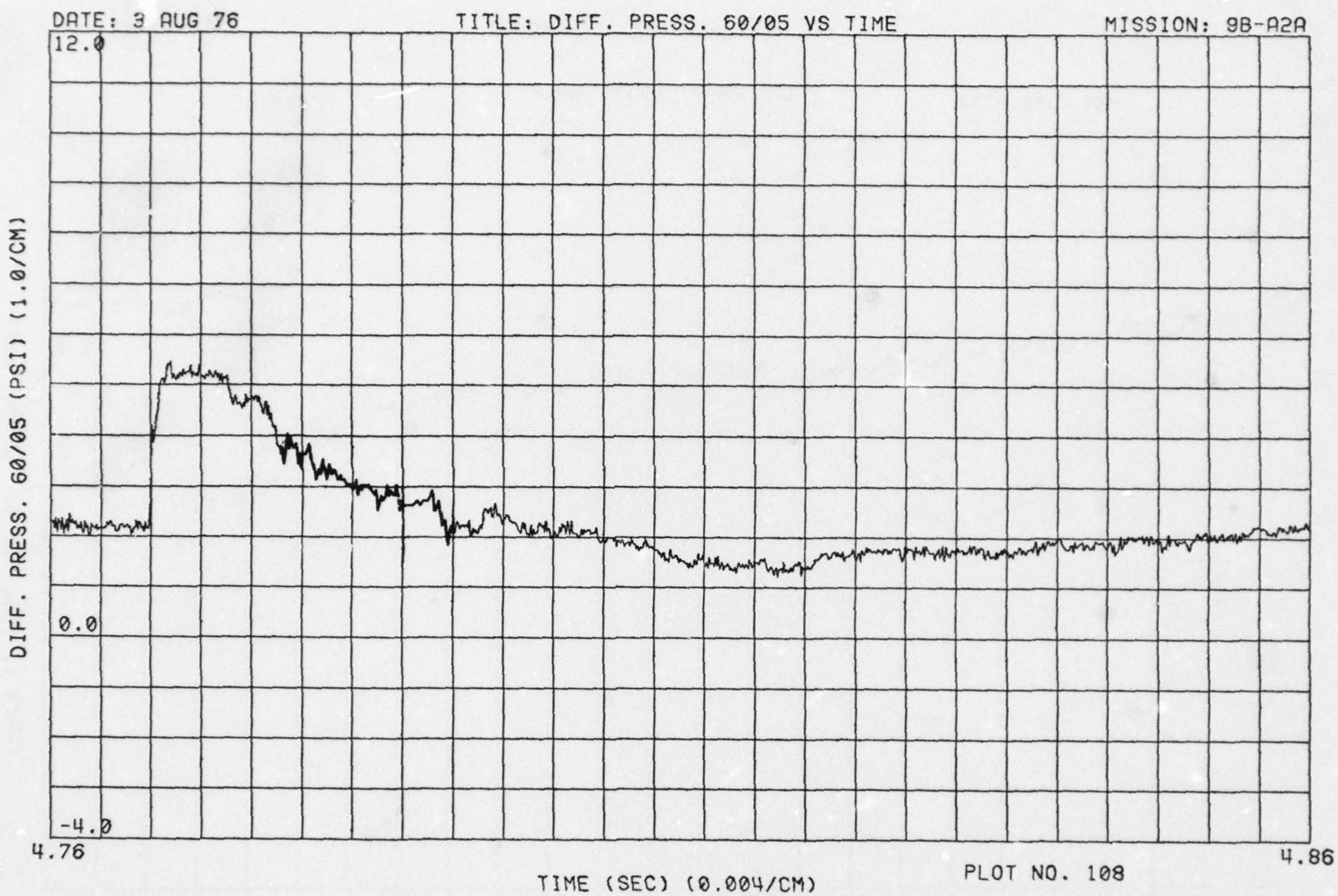


Figure 3. (Continued)

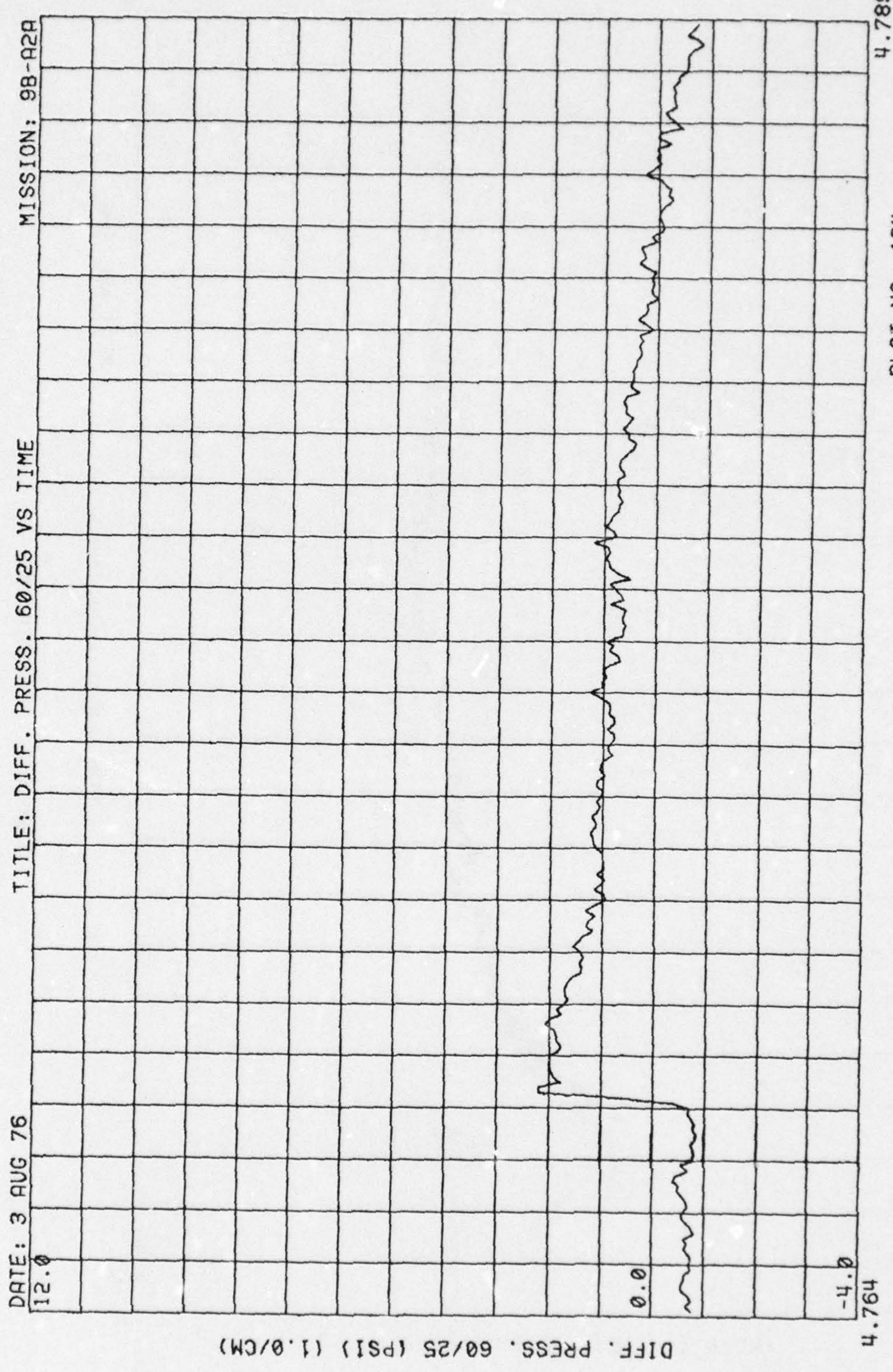


Figure 3. (Continued)

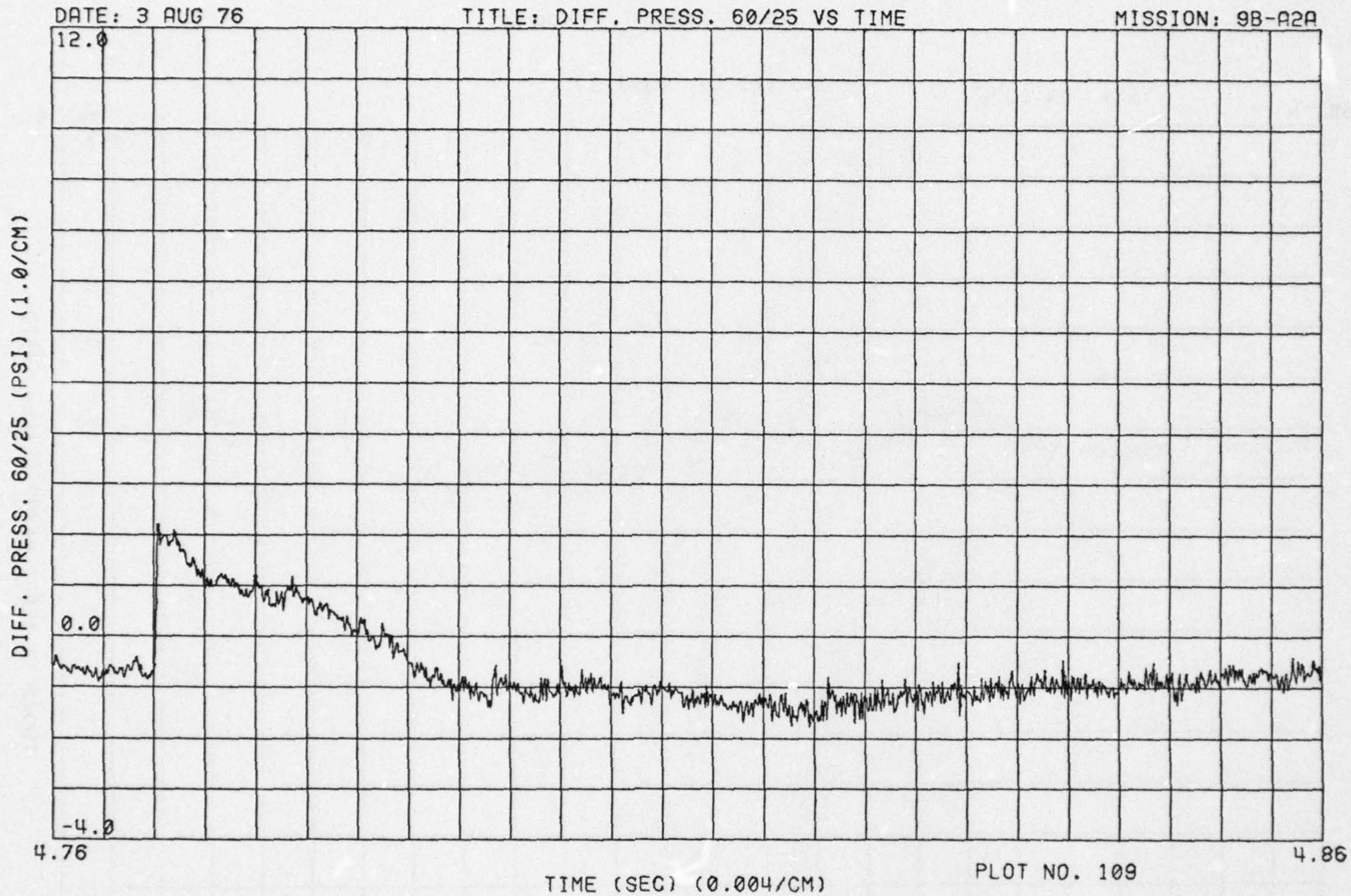


Figure 3. (Continued)

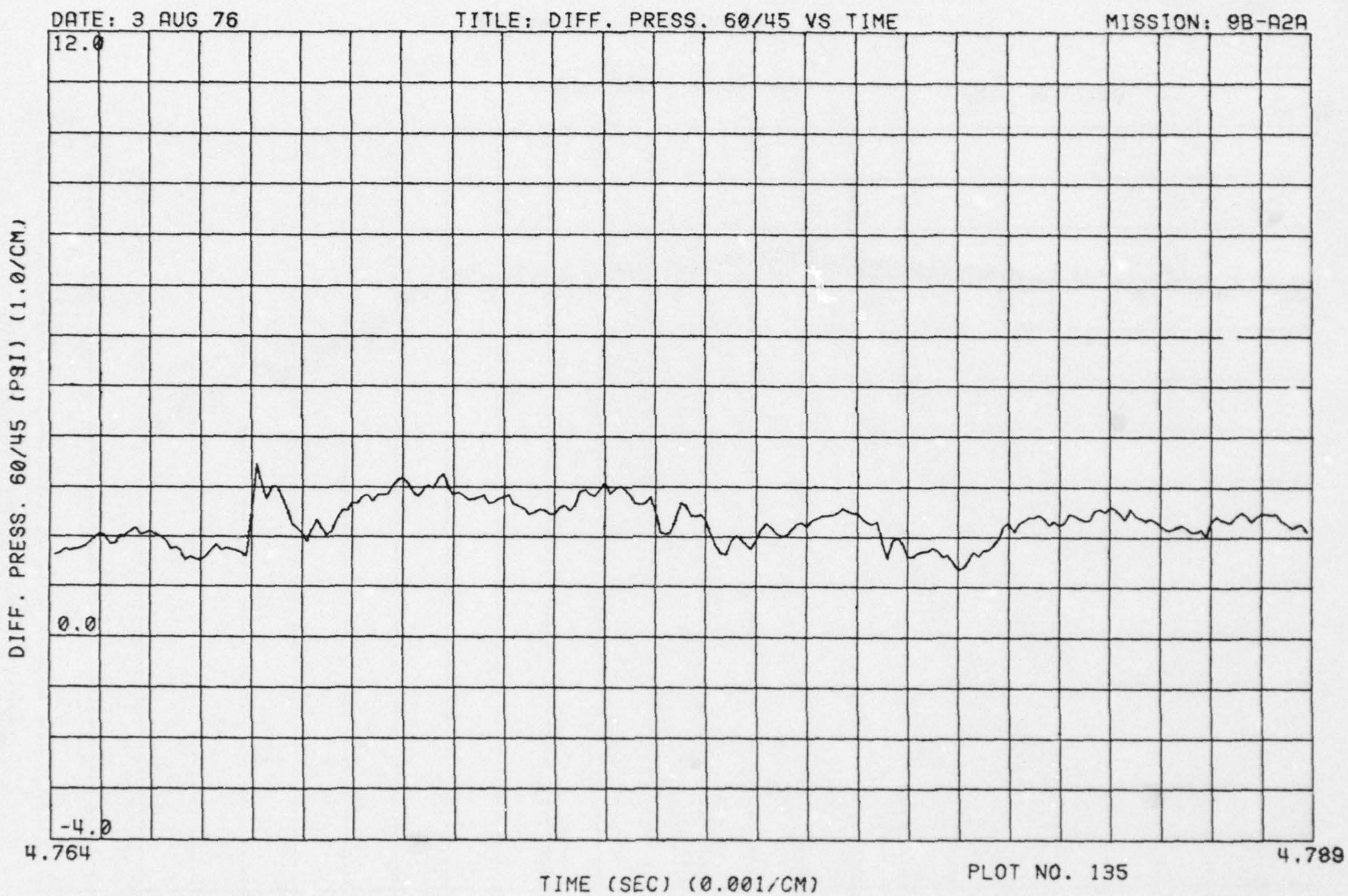


Figure 3. (Continued)

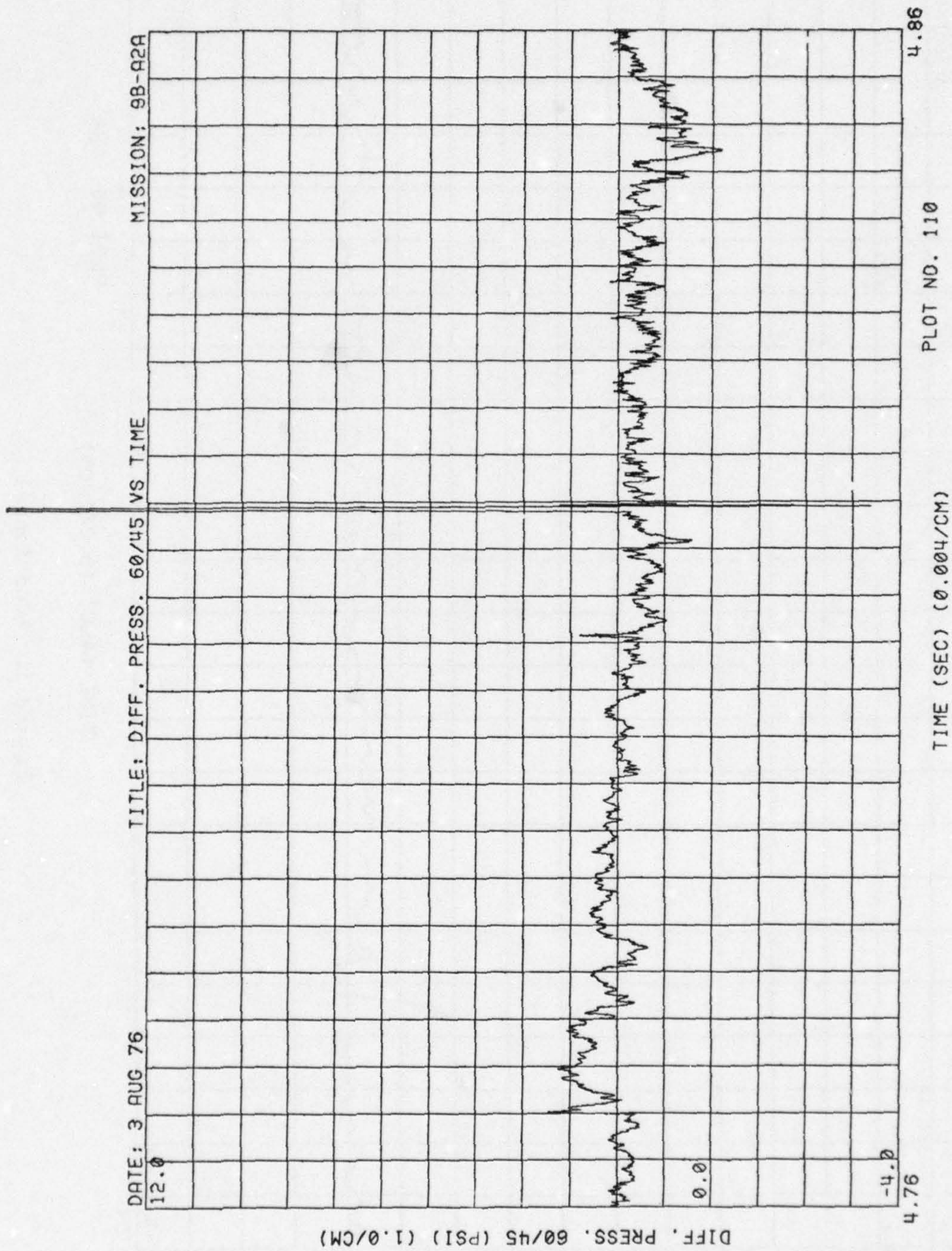


Figure 3. (Continued)

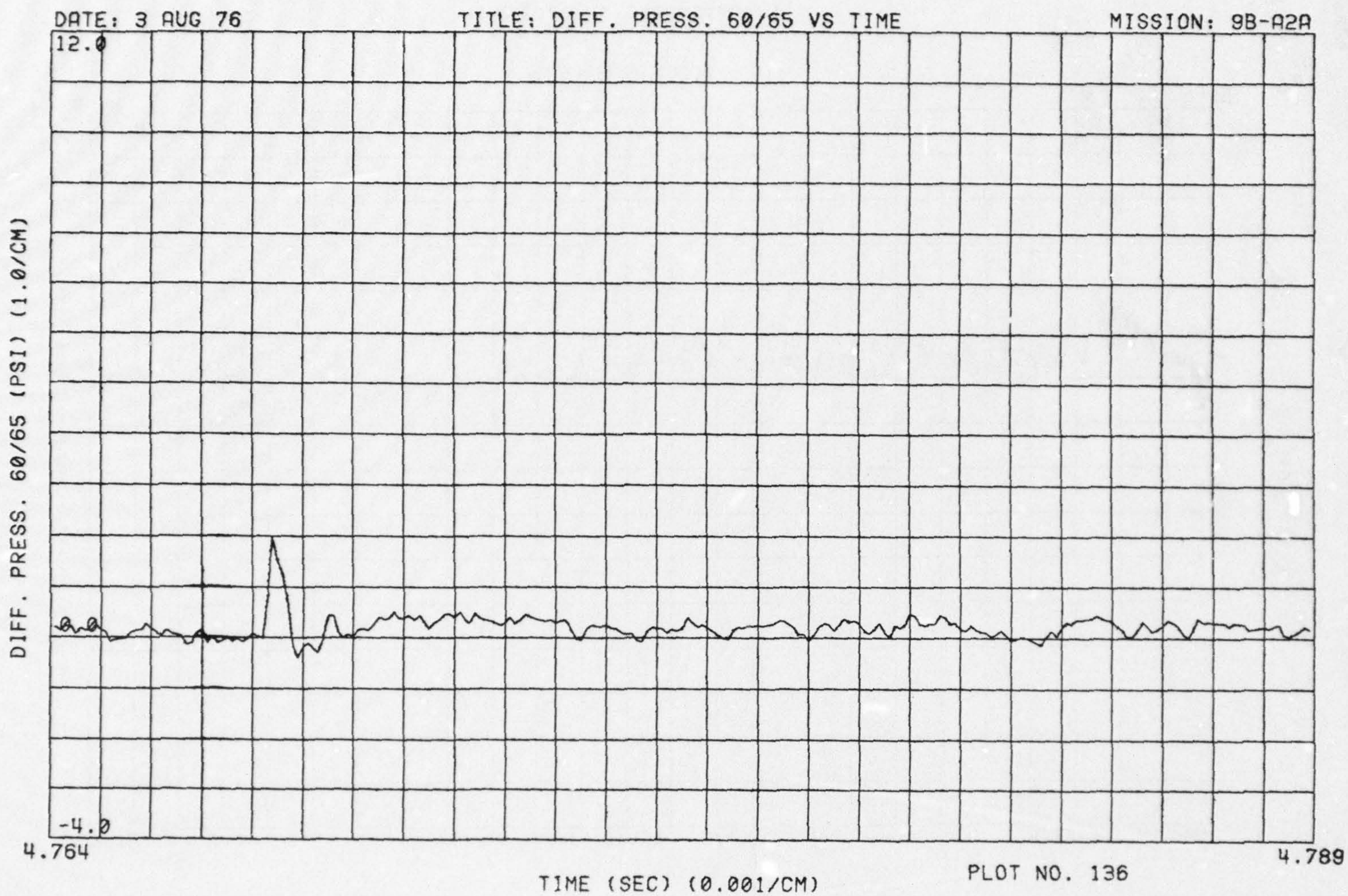


Figure 3. (Continued)

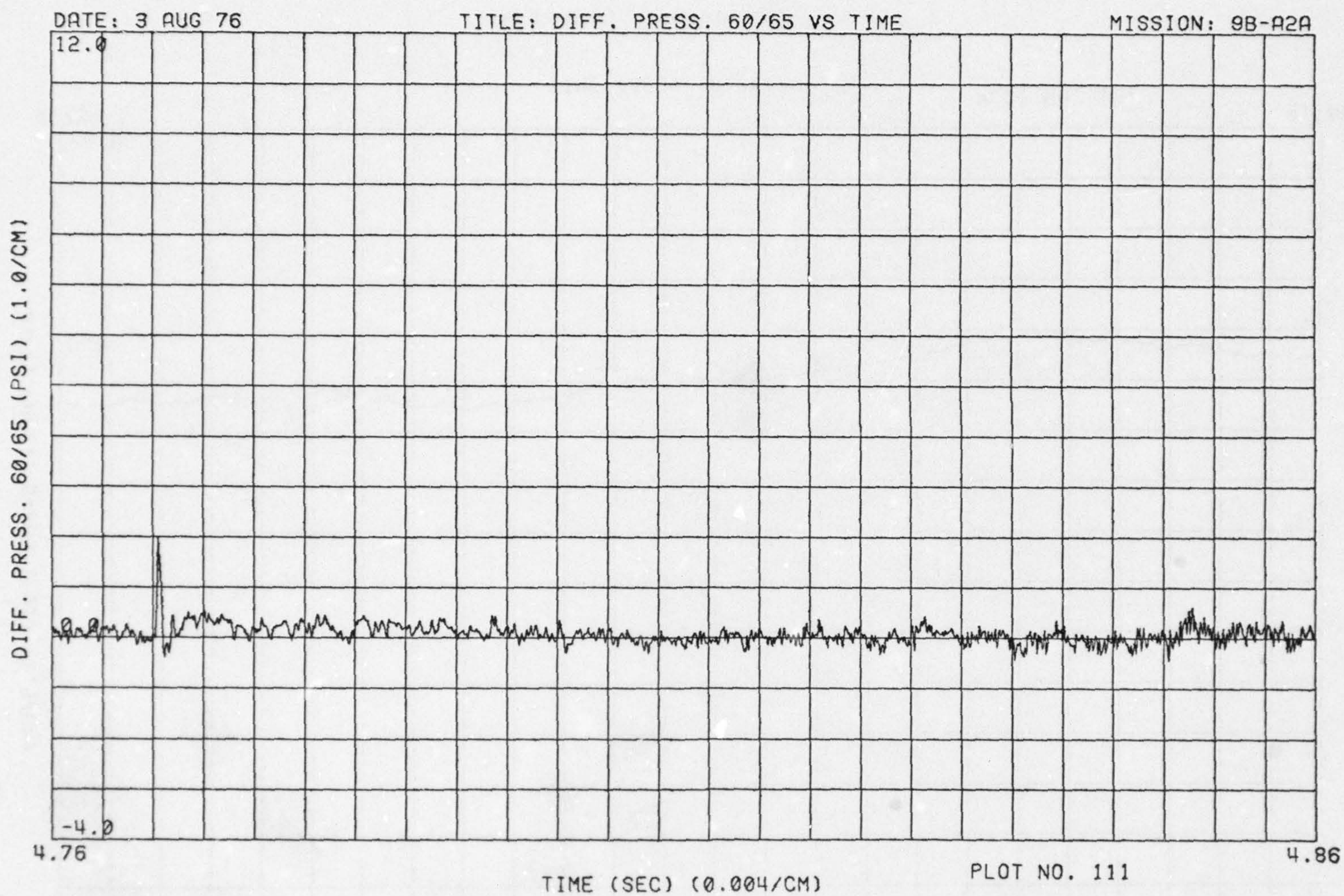


Figure 3. (Continued)

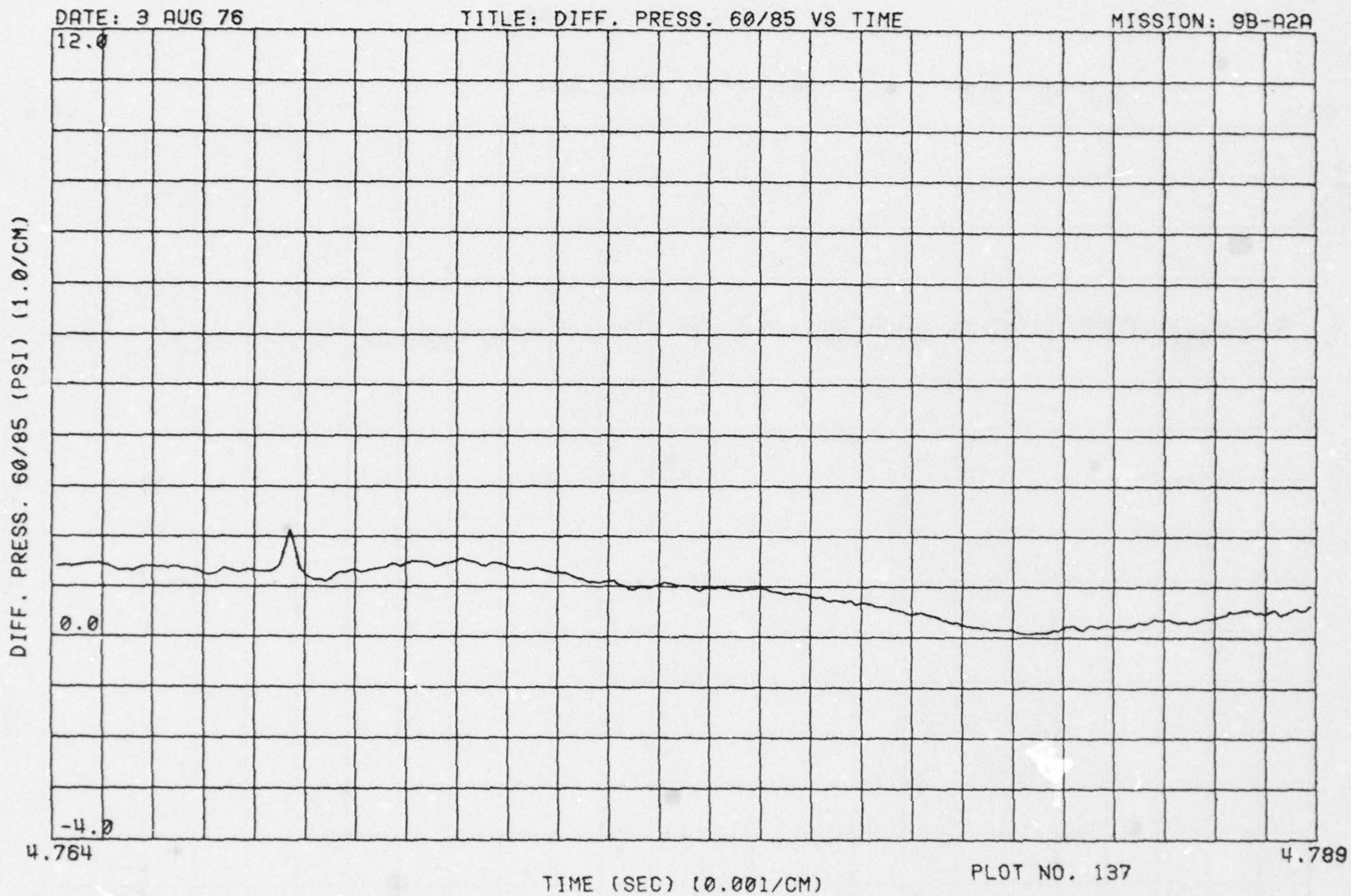


Figure 3. (Continued)

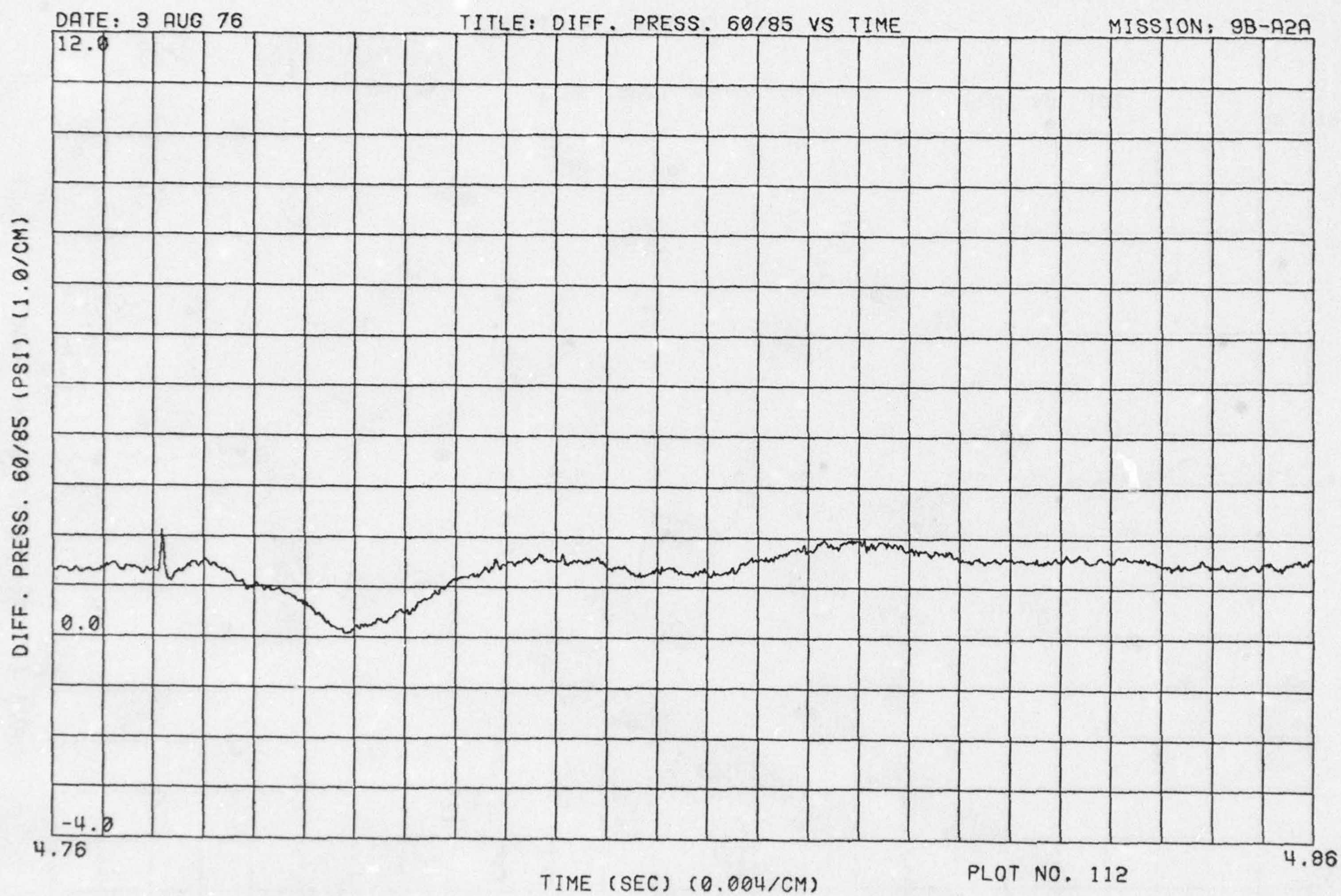


Figure 3. (Continued)

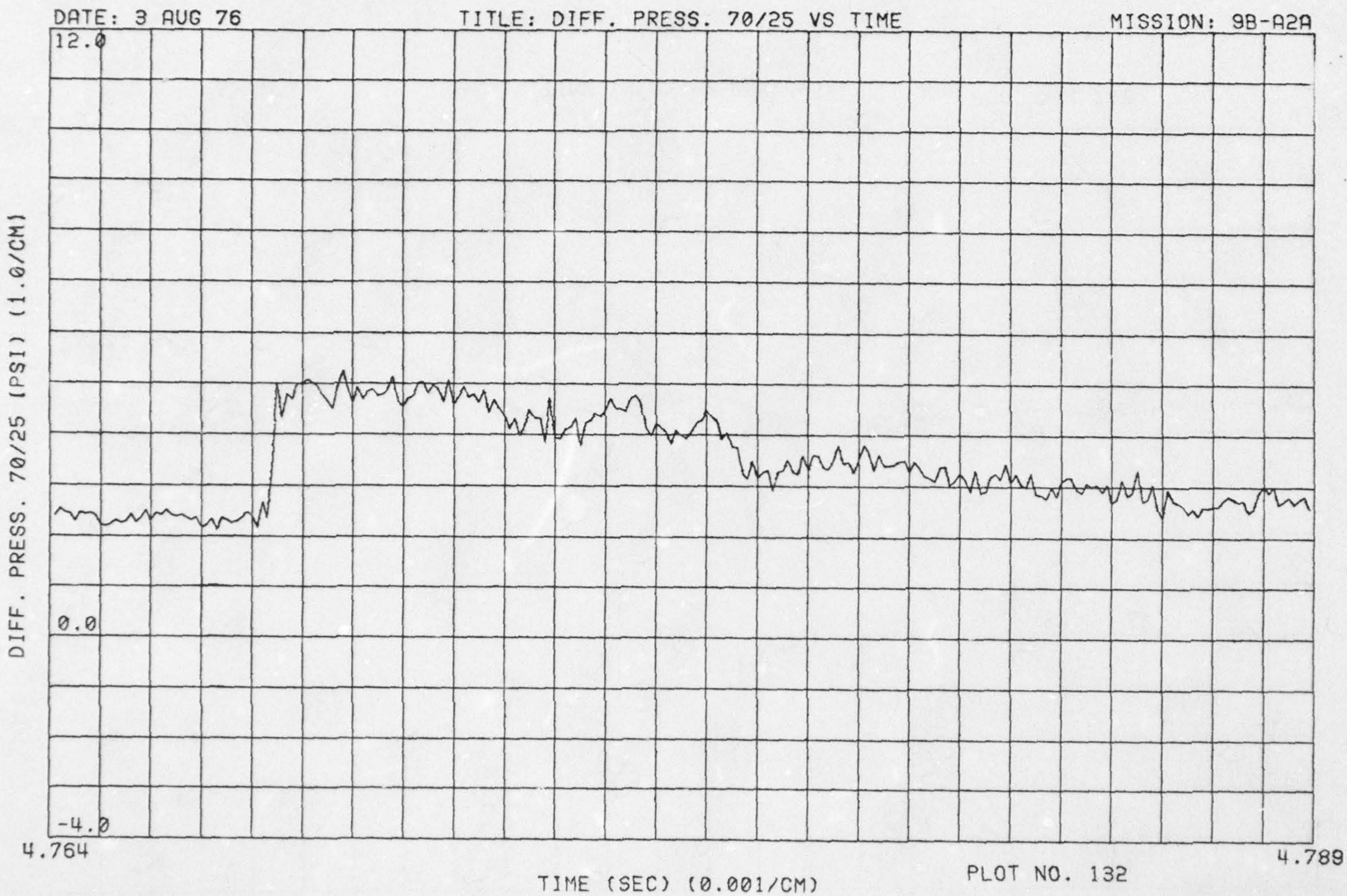


Figure 3. (Continued)

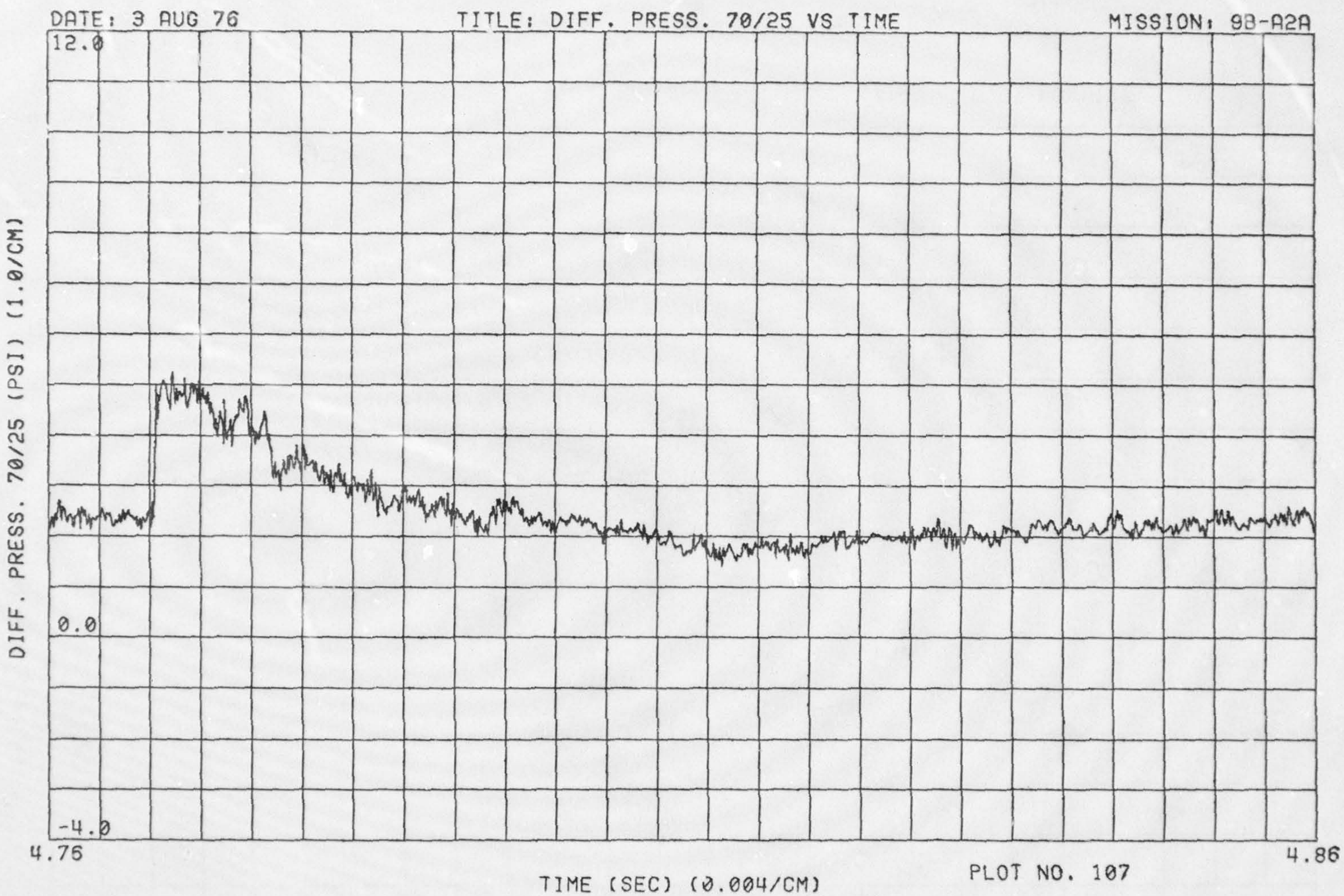


Figure 3. (Continued)

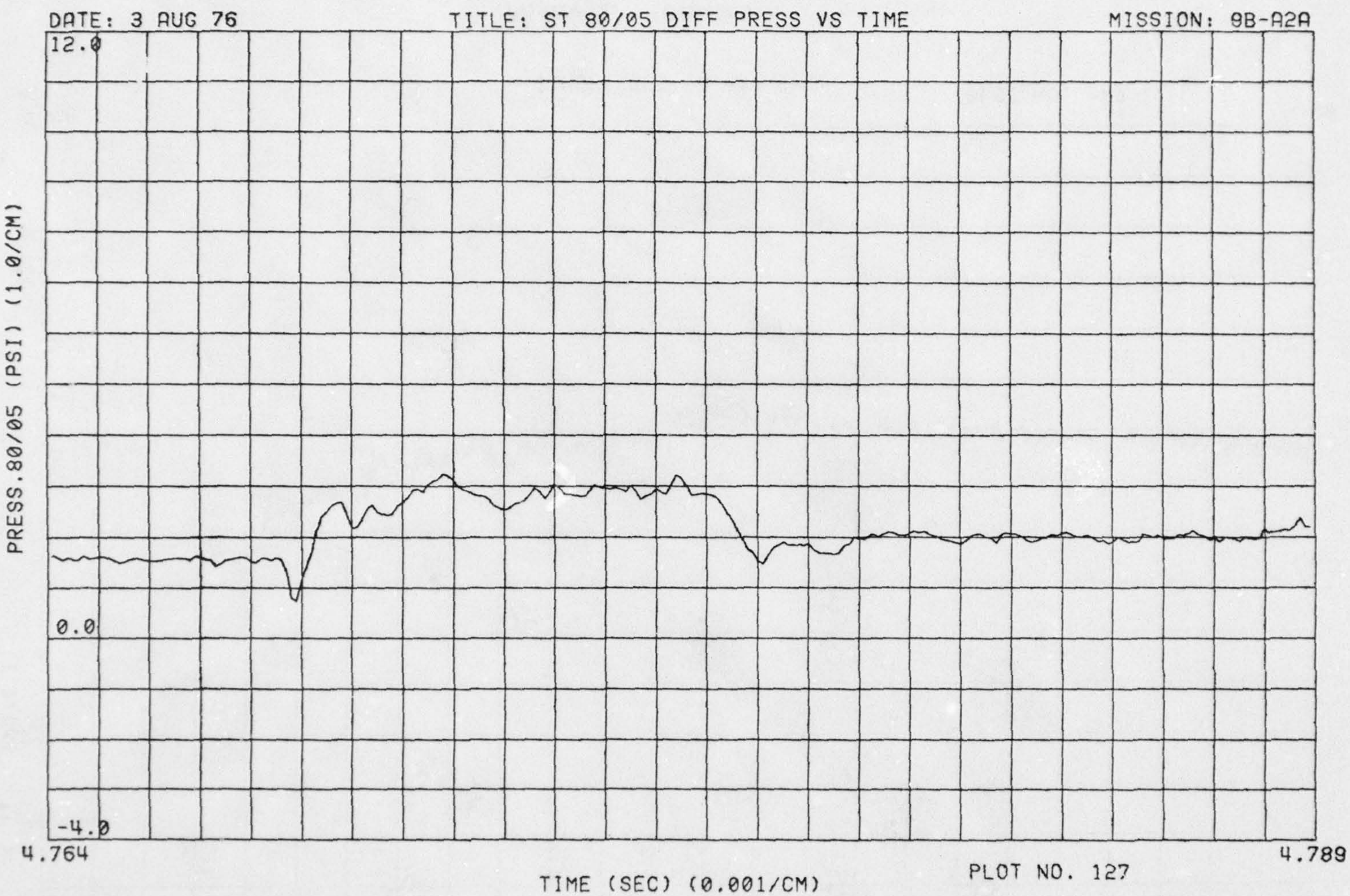


Figure 3. (Continued)

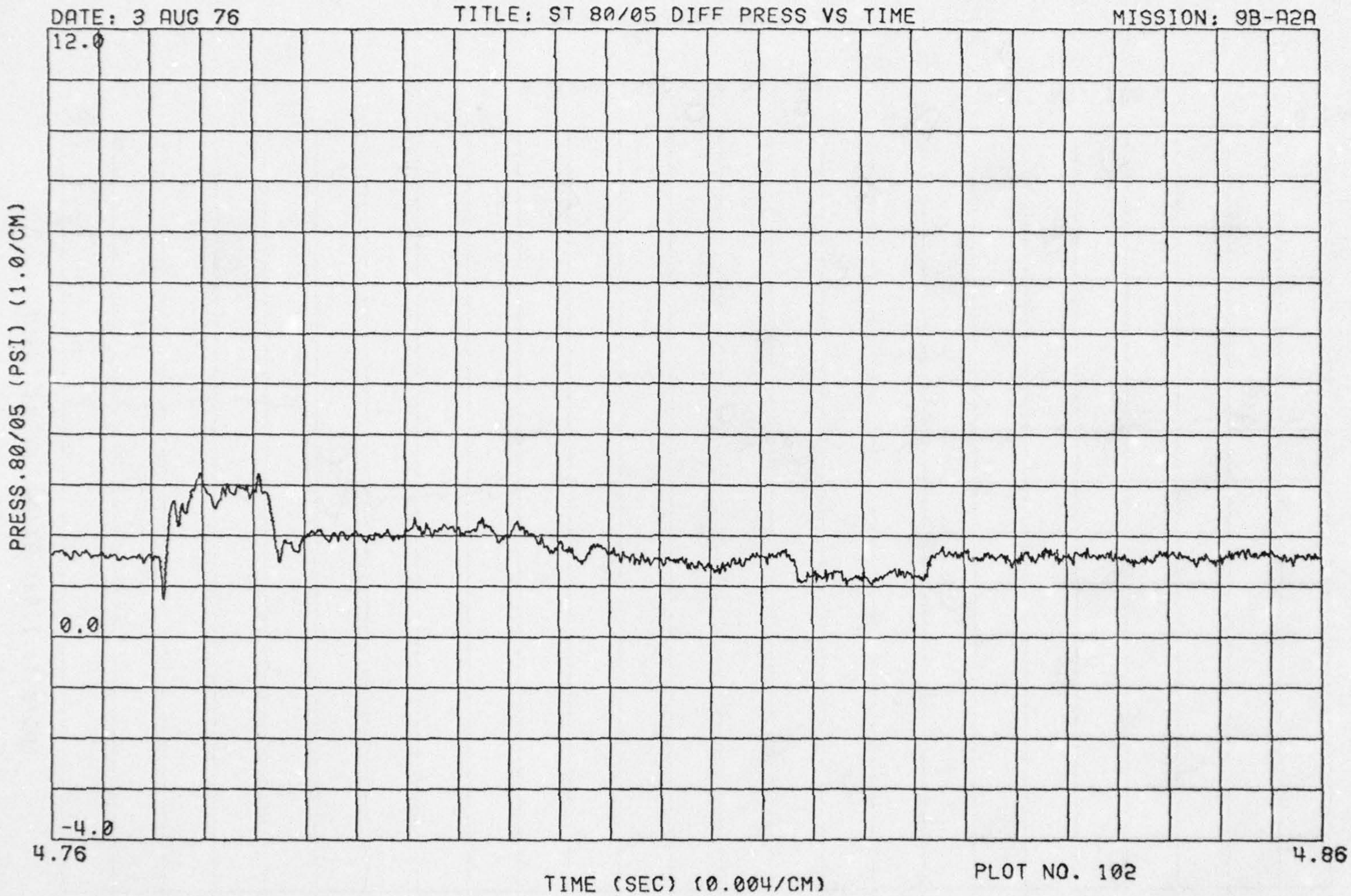


Figure 3. (Continued)

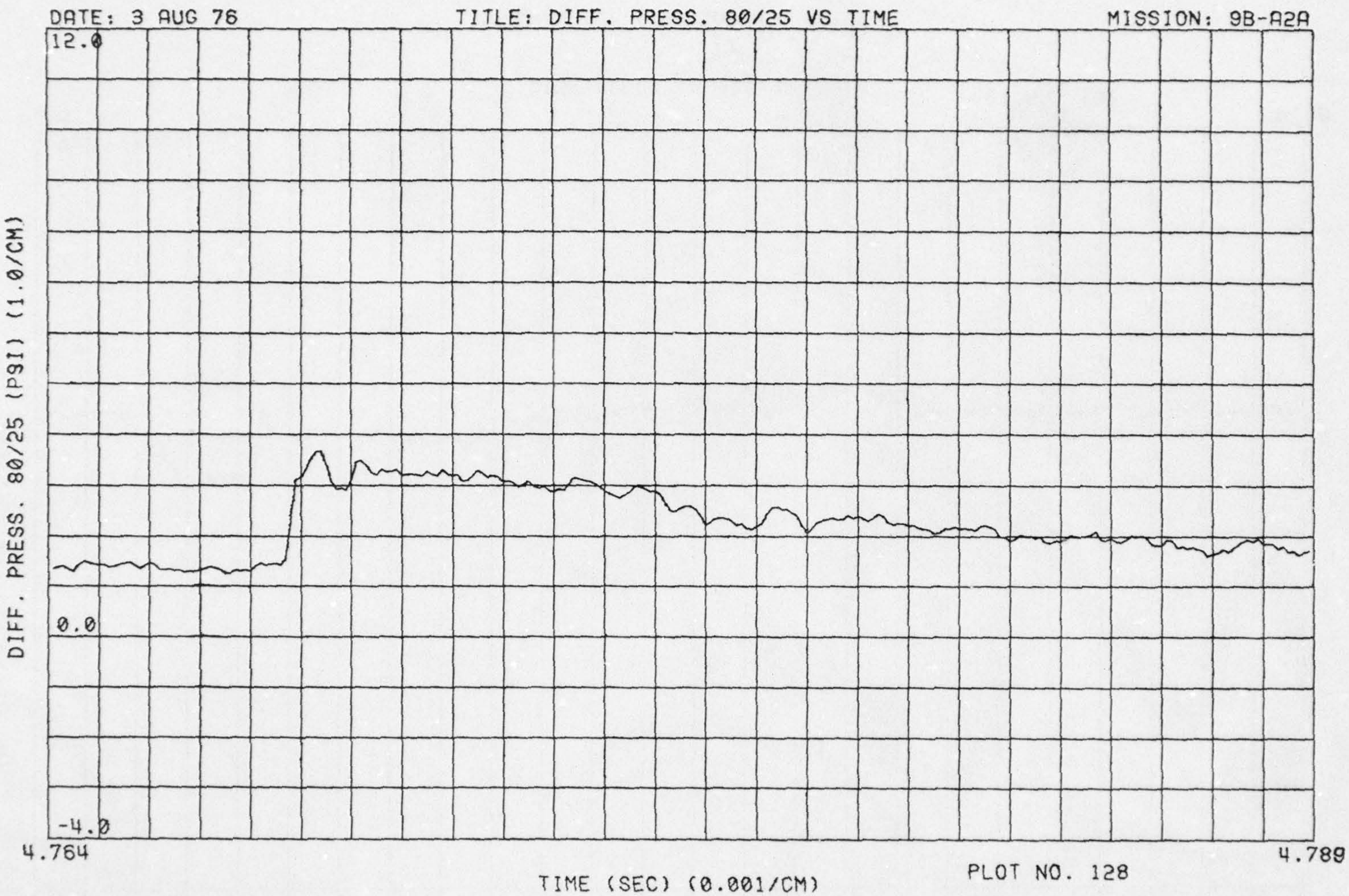


Figure 3. (Continued)

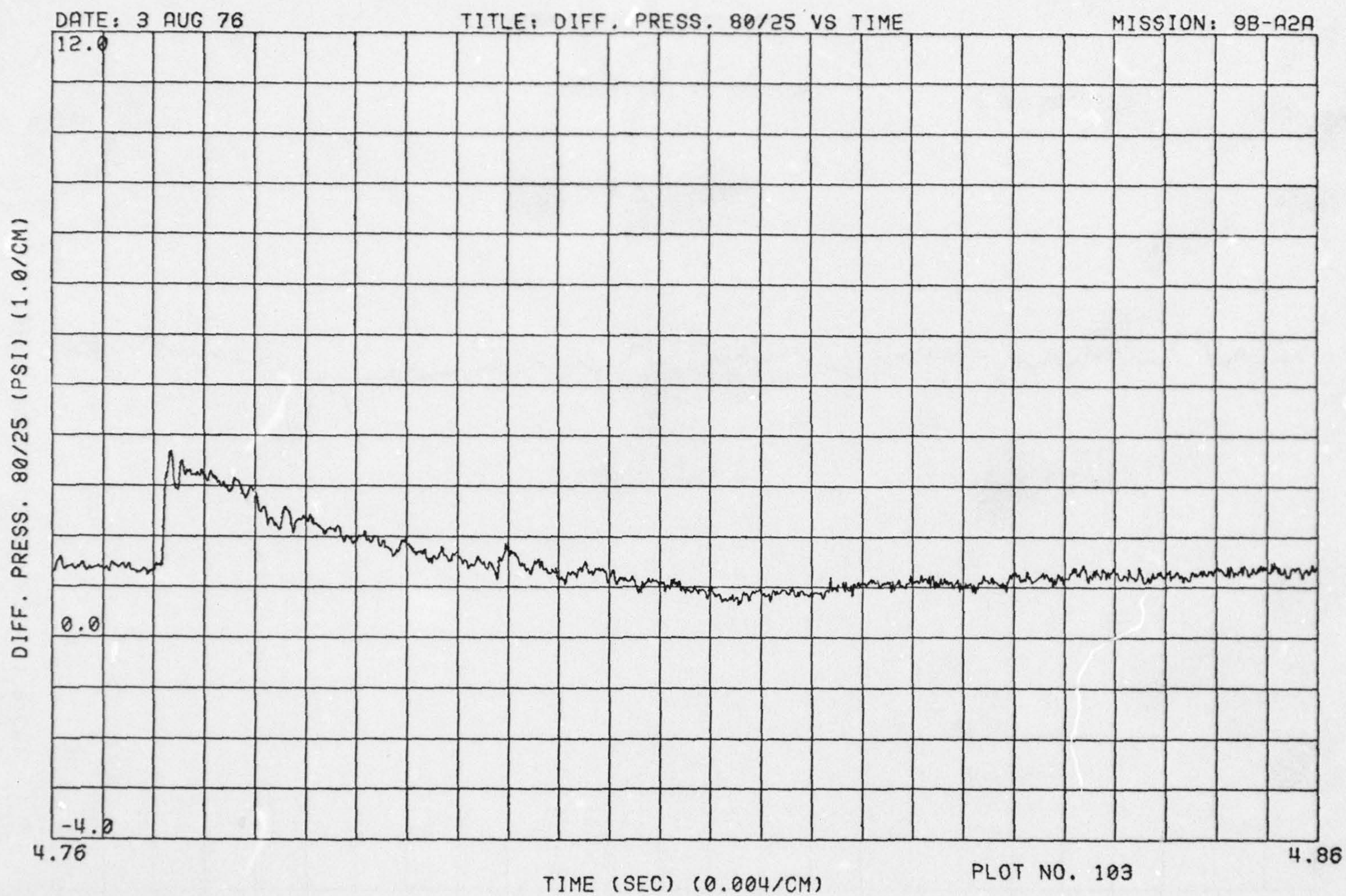


Figure 3. (Continued)

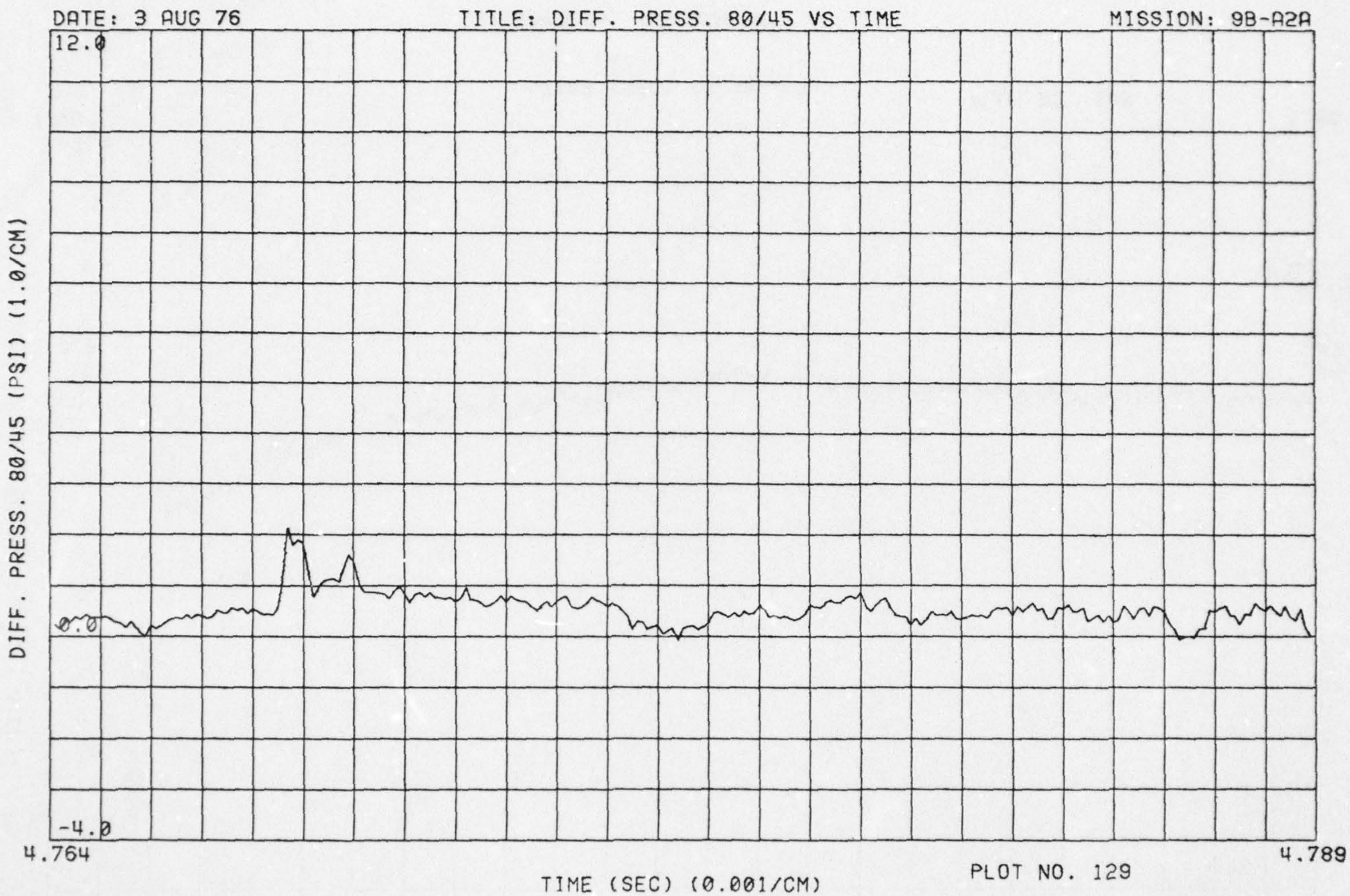


Figure 3. (Continued)

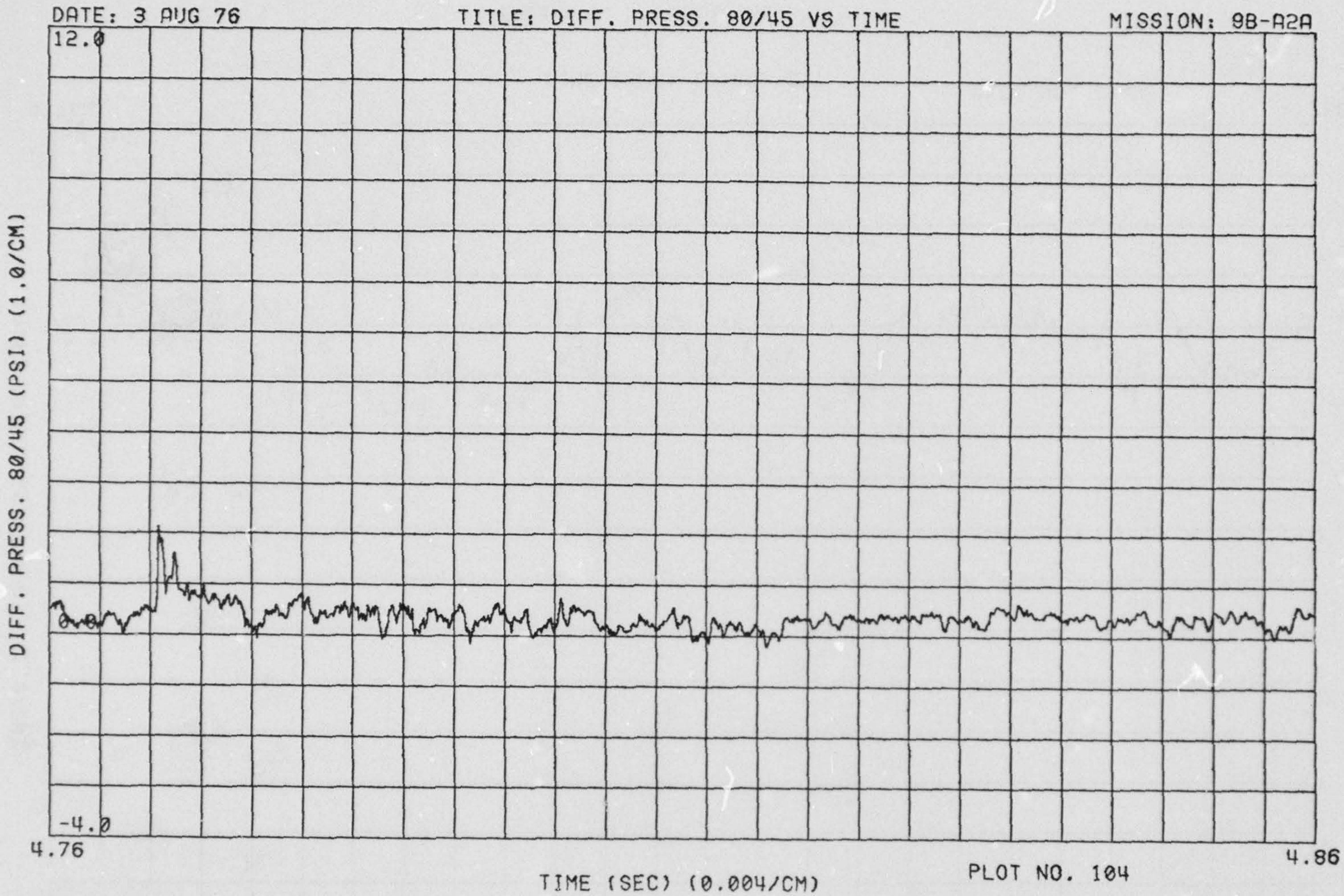


Figure 3. (Continued)

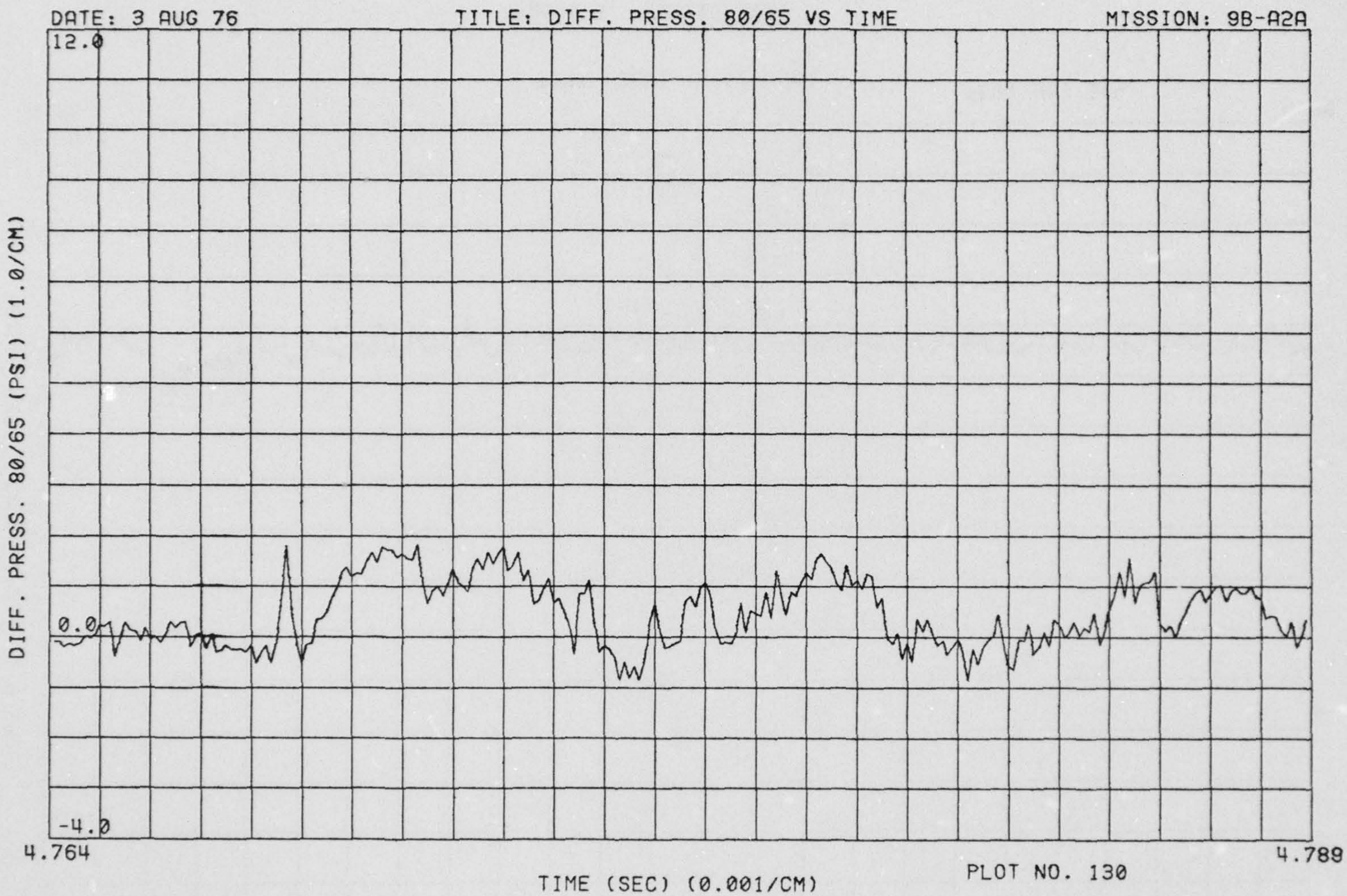


Figure 3. (Continued)

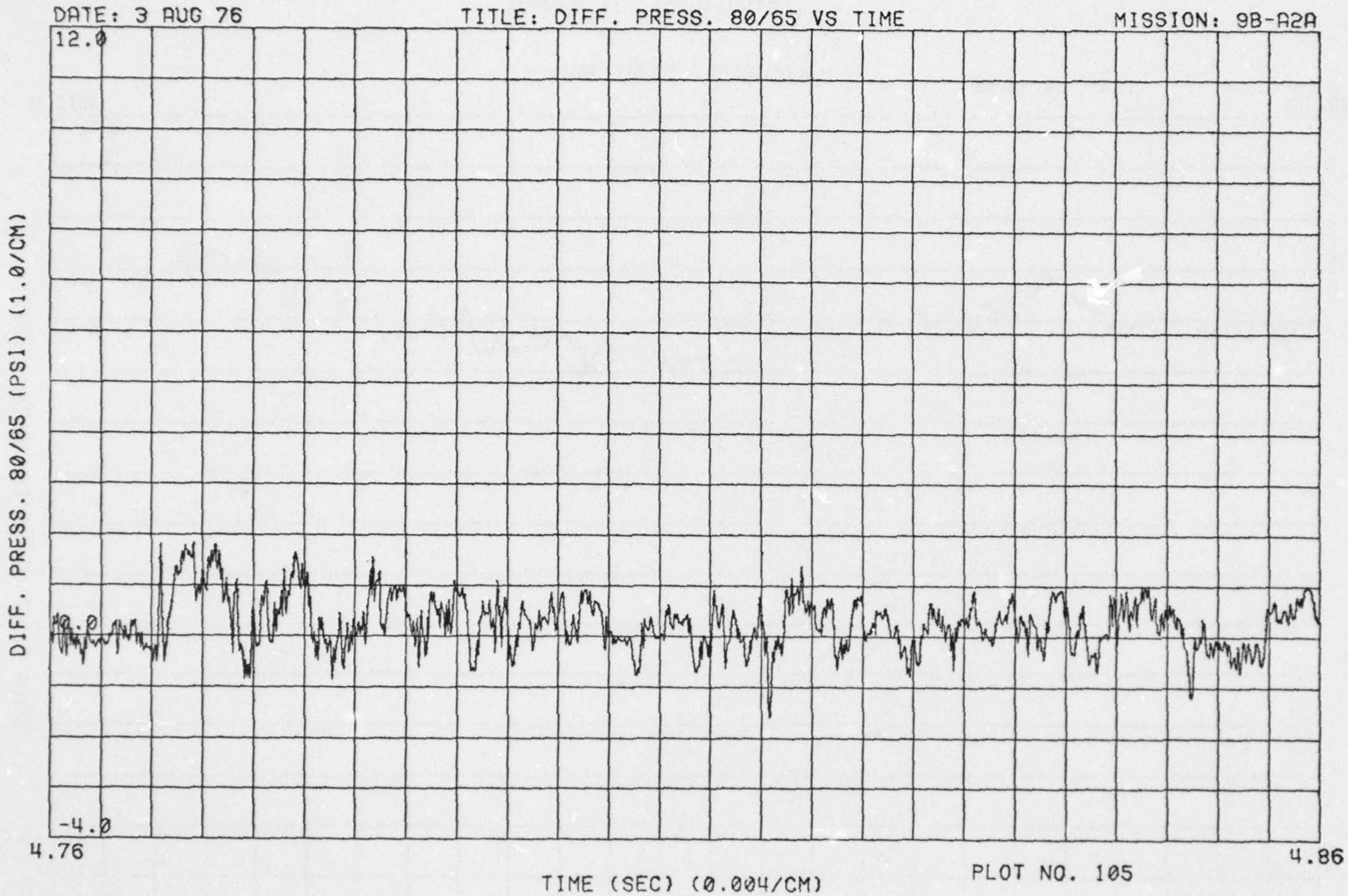


Figure 3. (Continued)

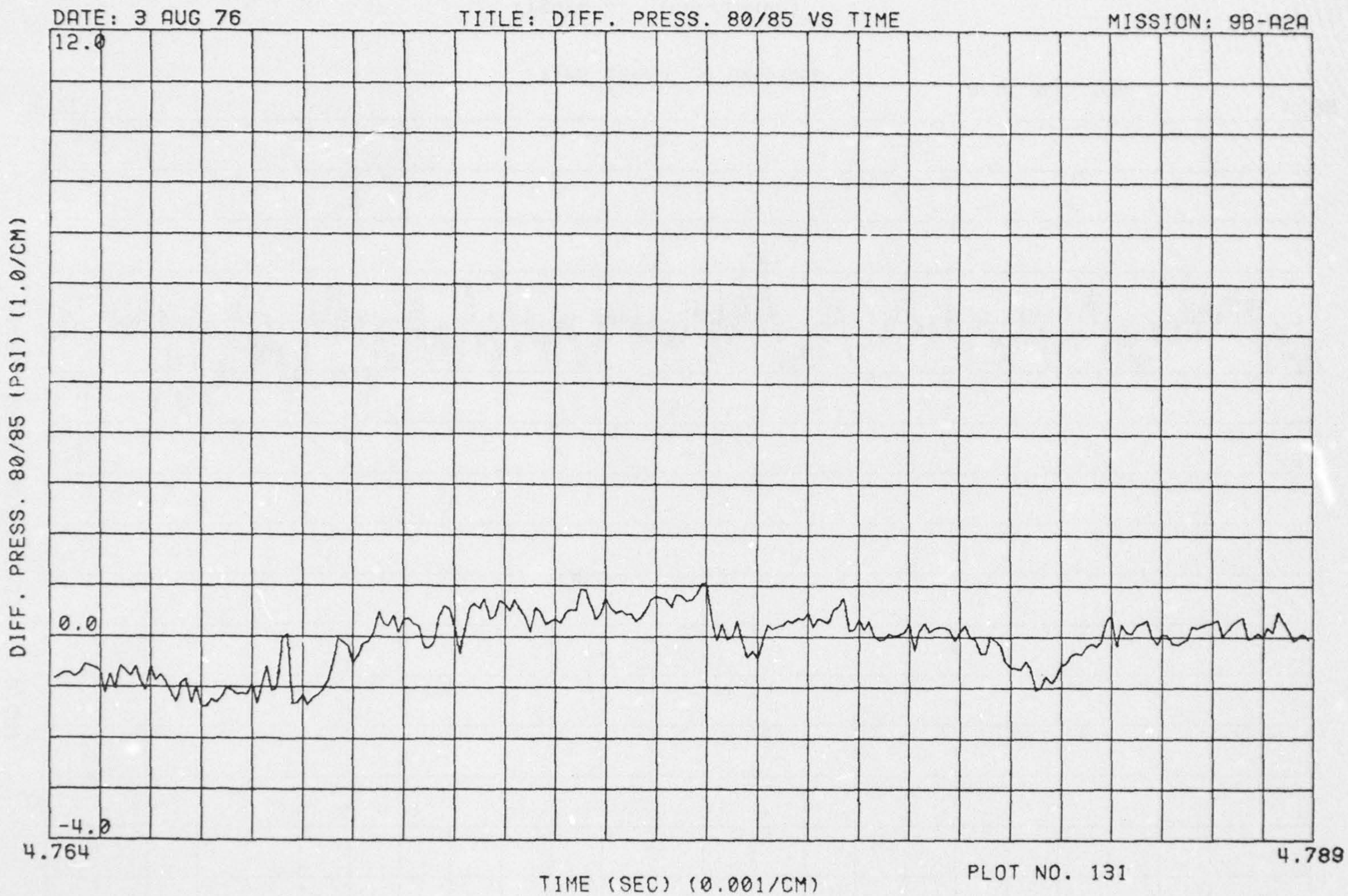


Figure 3. (Continued)

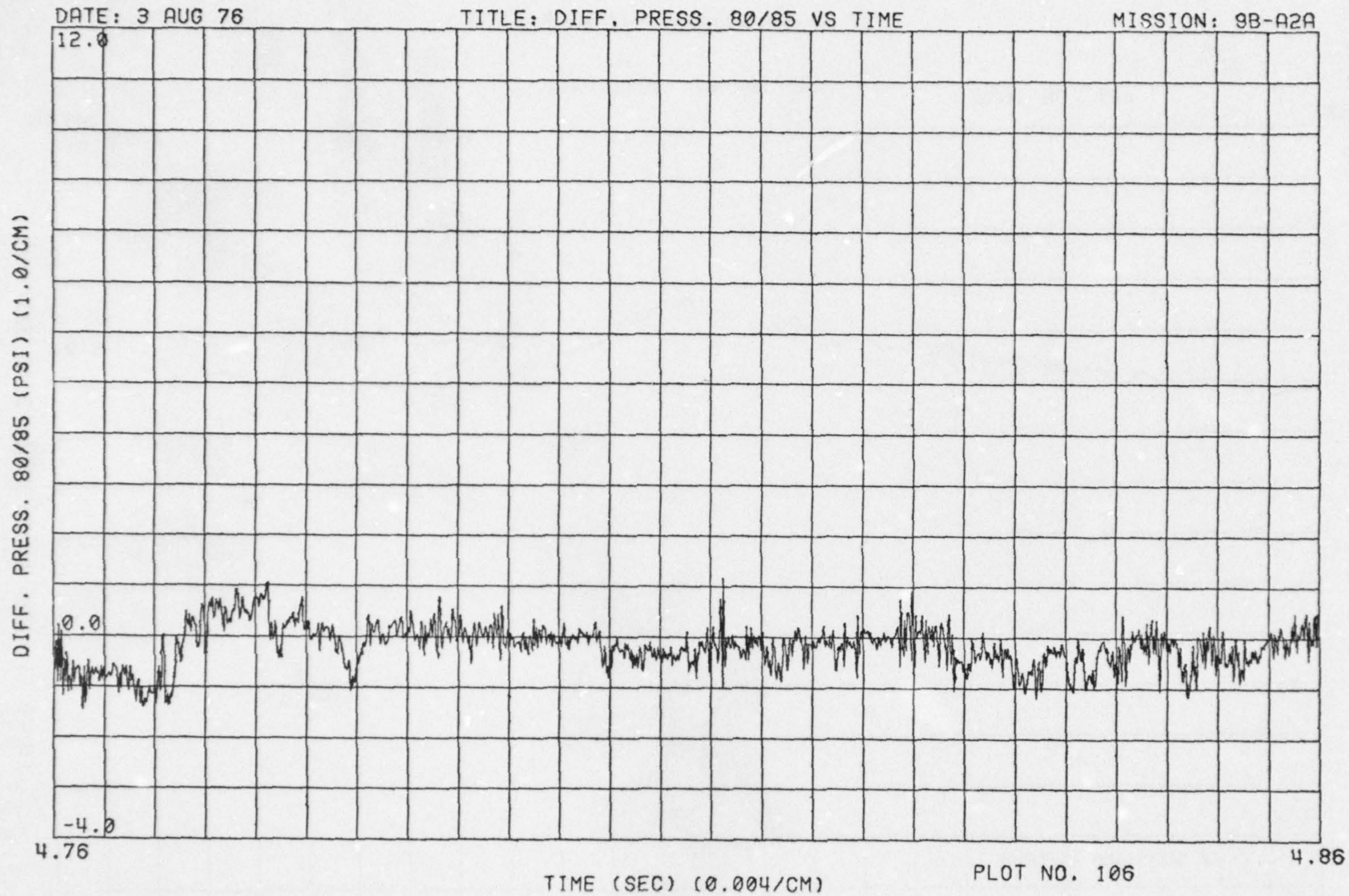


Figure 3. (Continued)

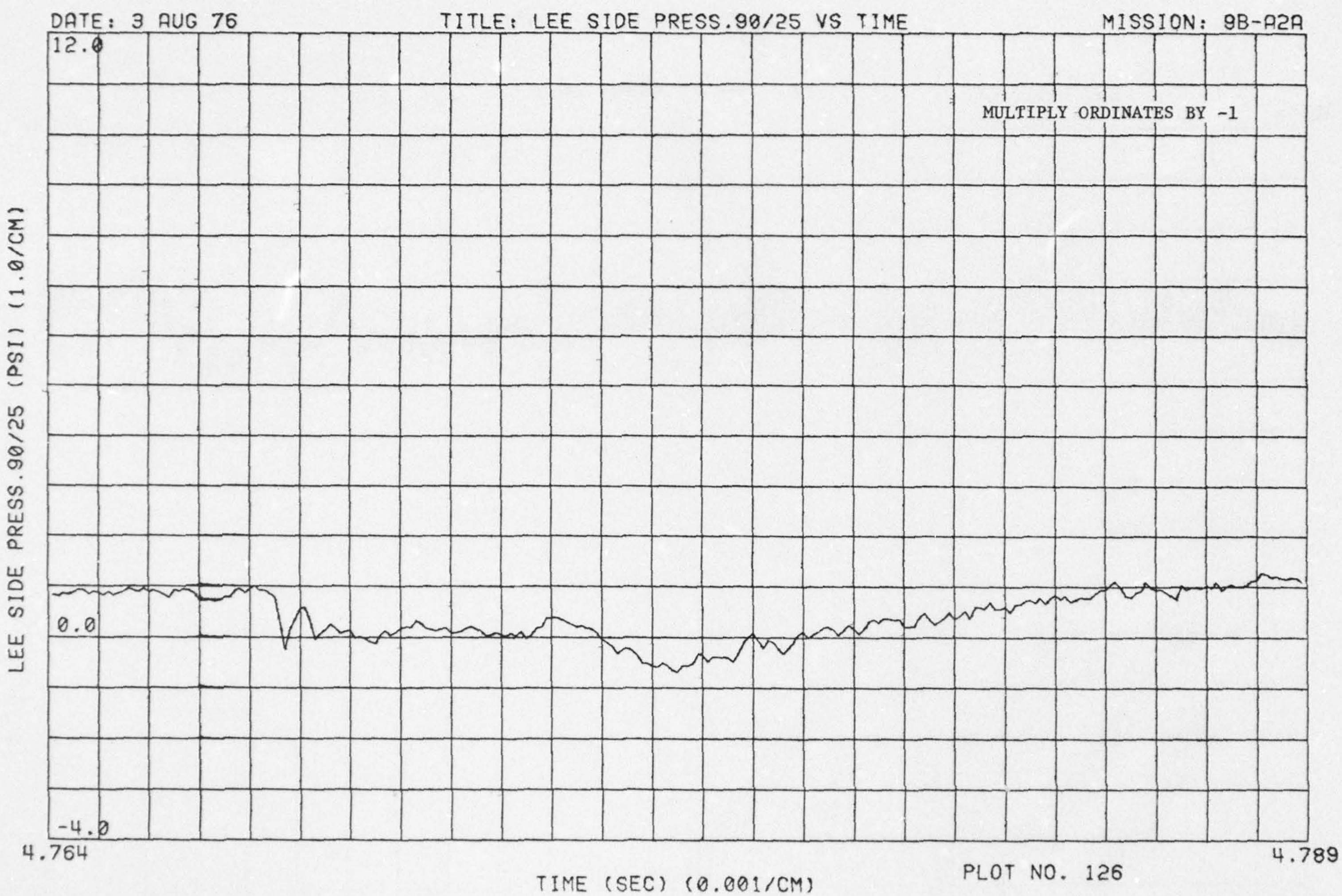


Figure 3. (Continued)

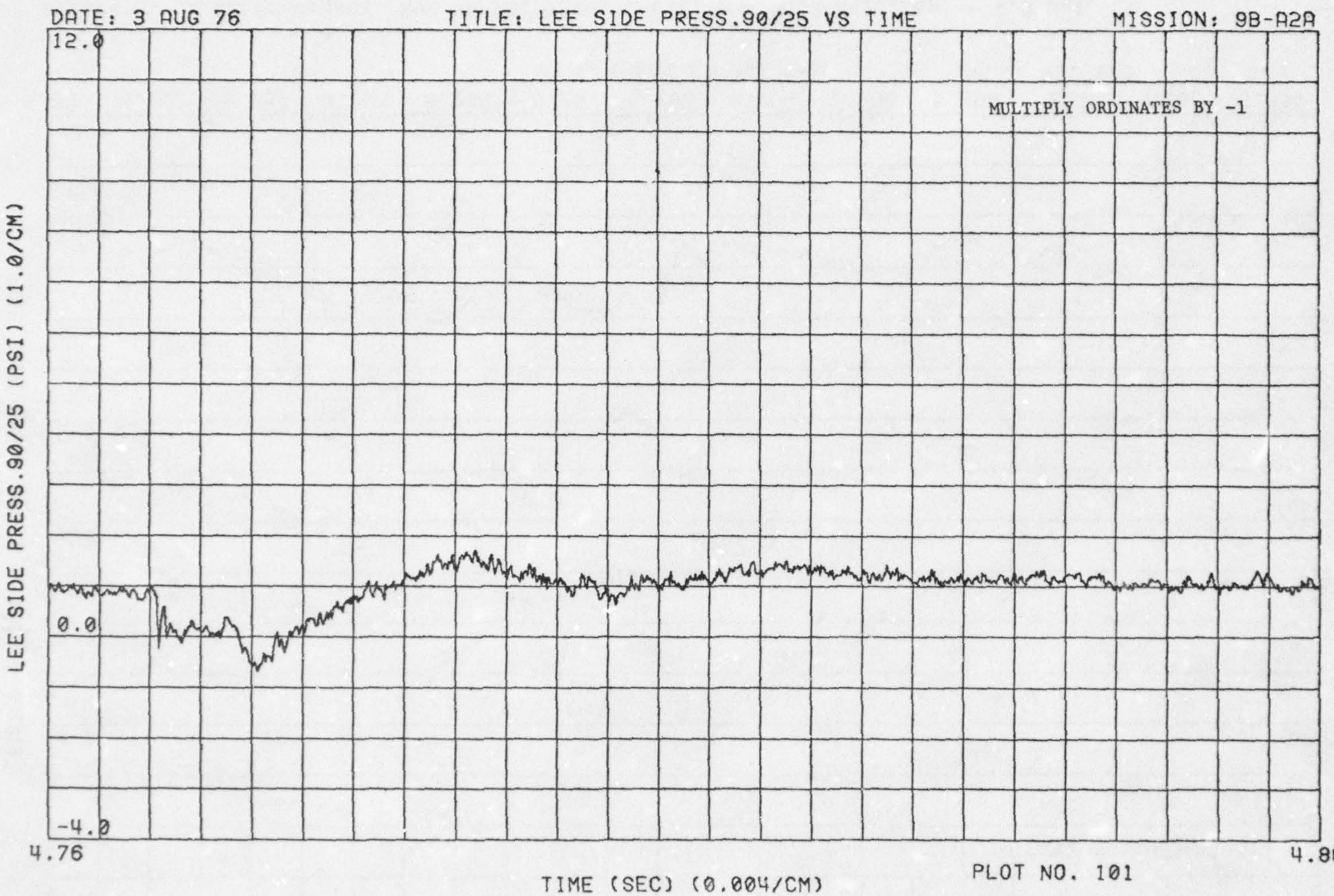


Figure 3. (Concluded)

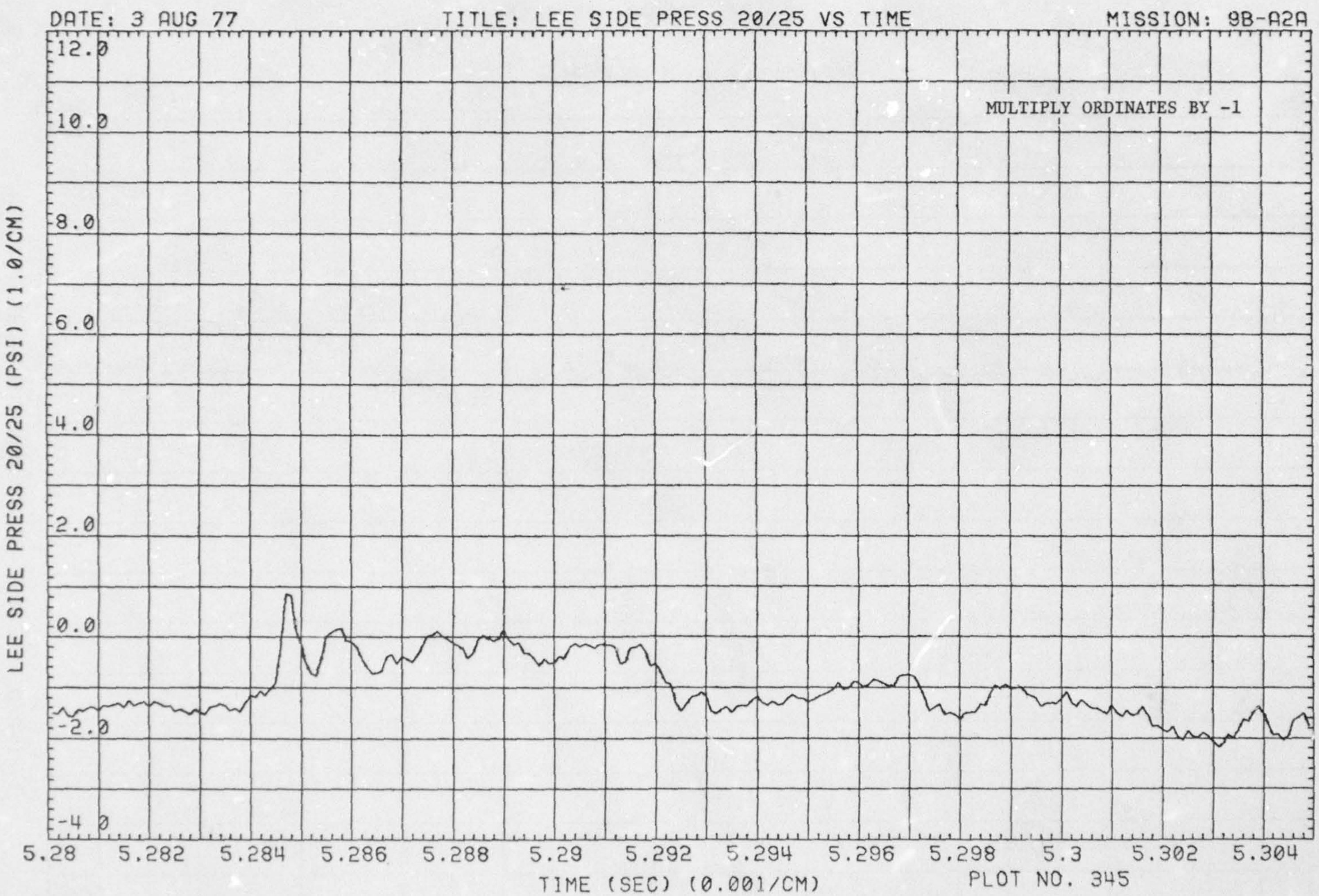


Figure 4. Wing Pressures, Run 9B-A2, Intercept 2, ϕ = 90.3 deg., Δp_s = 4.0 psi.

AD-A062 365 KAMAN AVIDYNE BURLINGTON MASS F/G 19/4

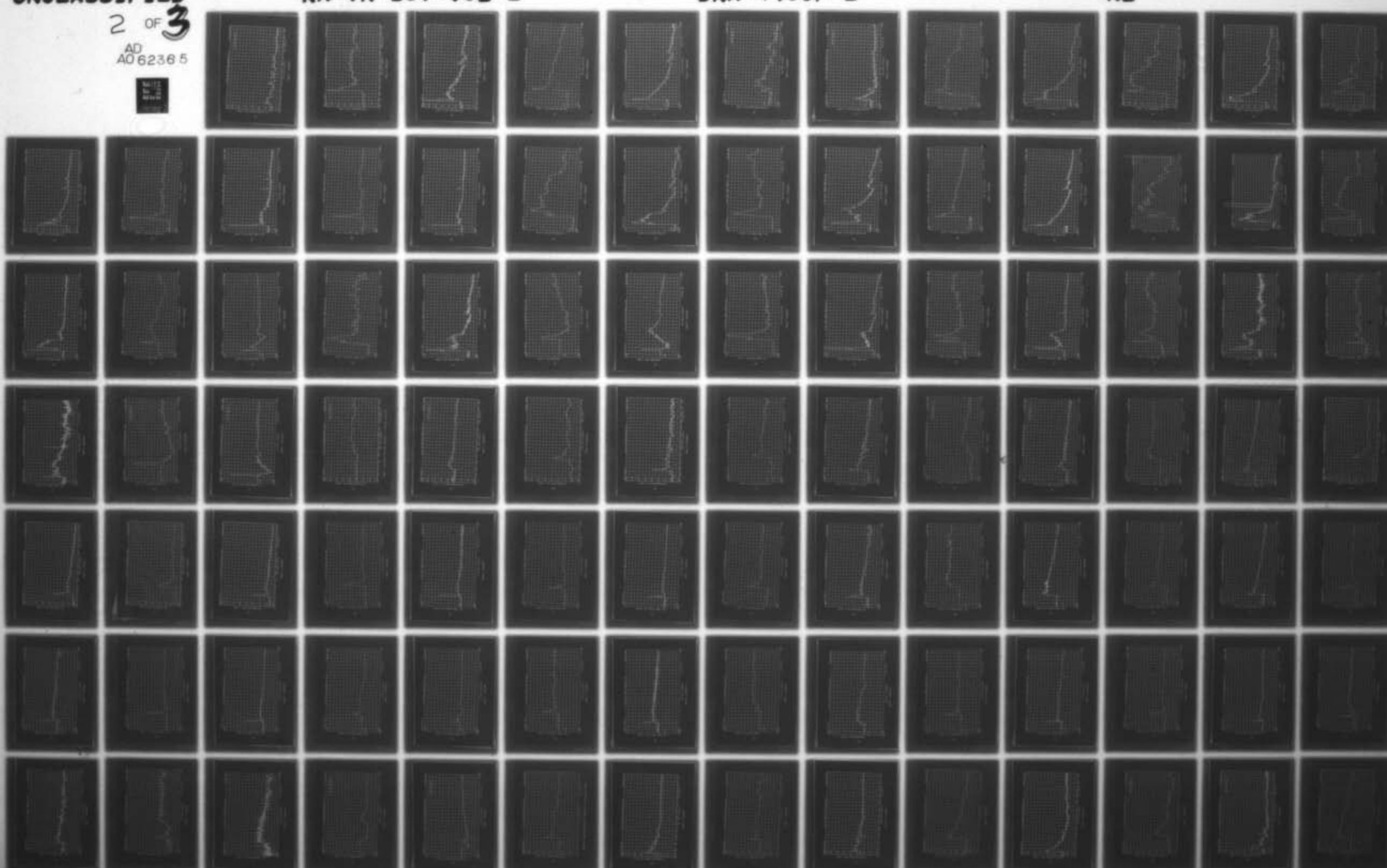
MEASUREMENTS OF BLAST PRESSURES ON A RIGID 65 DEGREE SWEPTBACK --ETC(U)

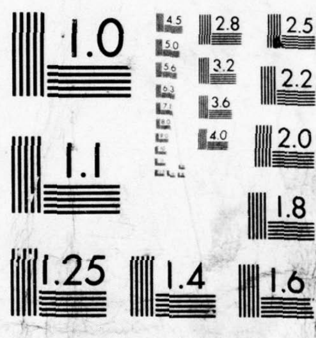
JUN 77 J R RUETENIK, R F SMILEY DNA001-76-C-0106

UNCLASSIFIED KA-TR-137-VOL-2 DNA-4400F-2 NL

2 OF 3

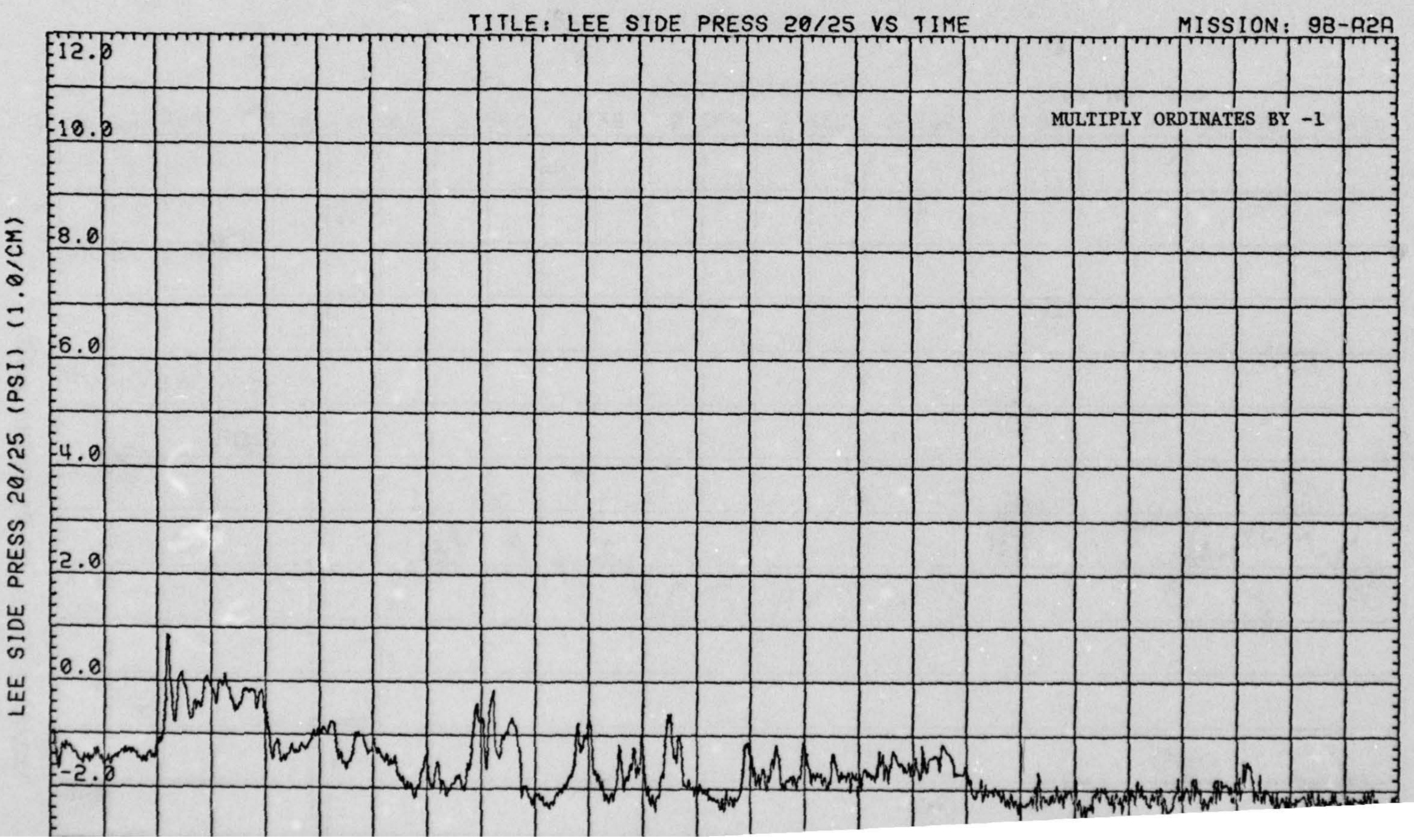
AD
A062365





MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS-1963-A


TITLE: LEE SIDE PRESS 20/25 VS TIME
MISSION: 9B-A2A
MULTIPLY ORDINATES BY -1
LEE SIDE PRESS 20/25 (PSI) (1.0/CM)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
-2.0

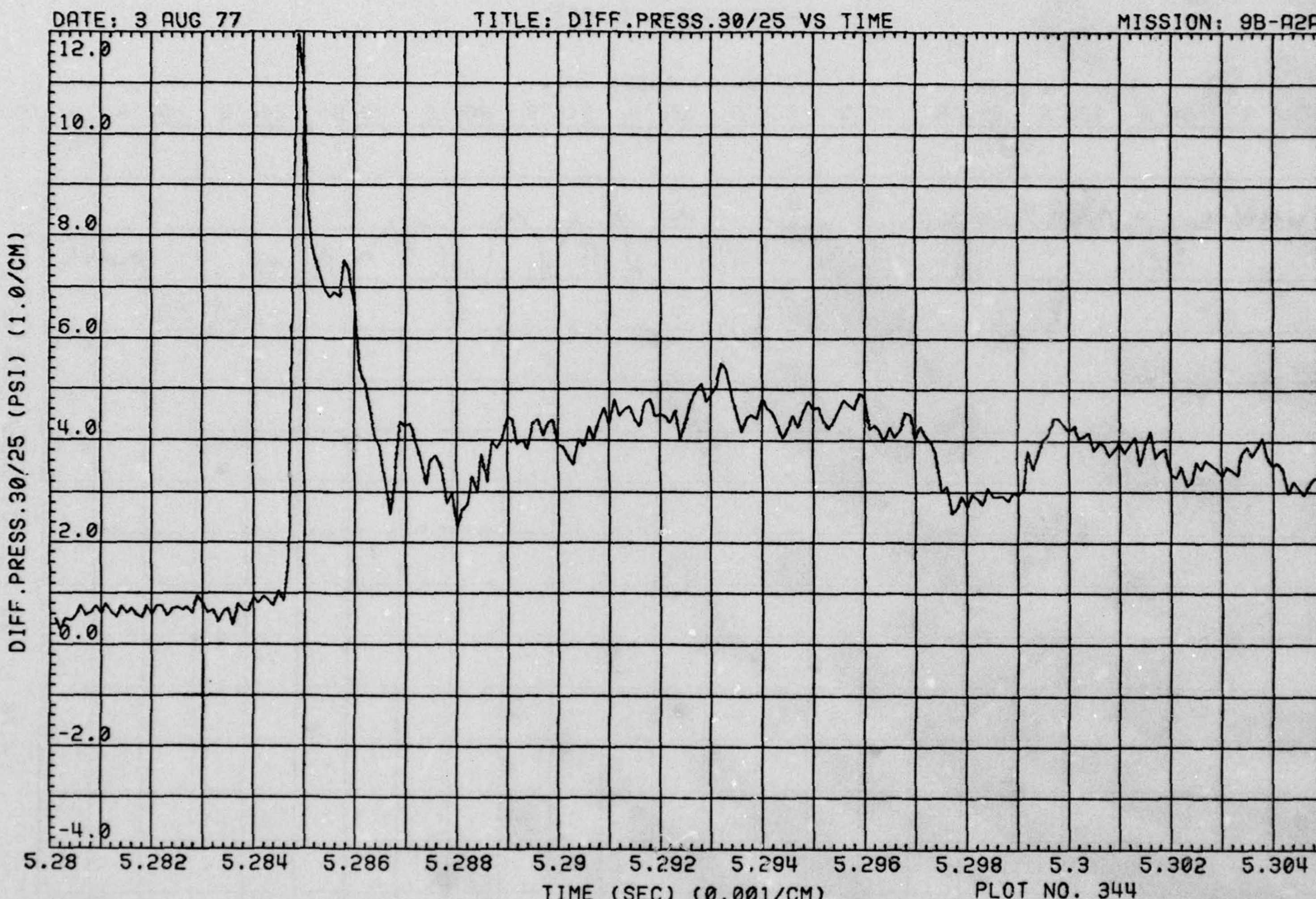


Figure 4. (Continued)

Figure 4. (Continued)

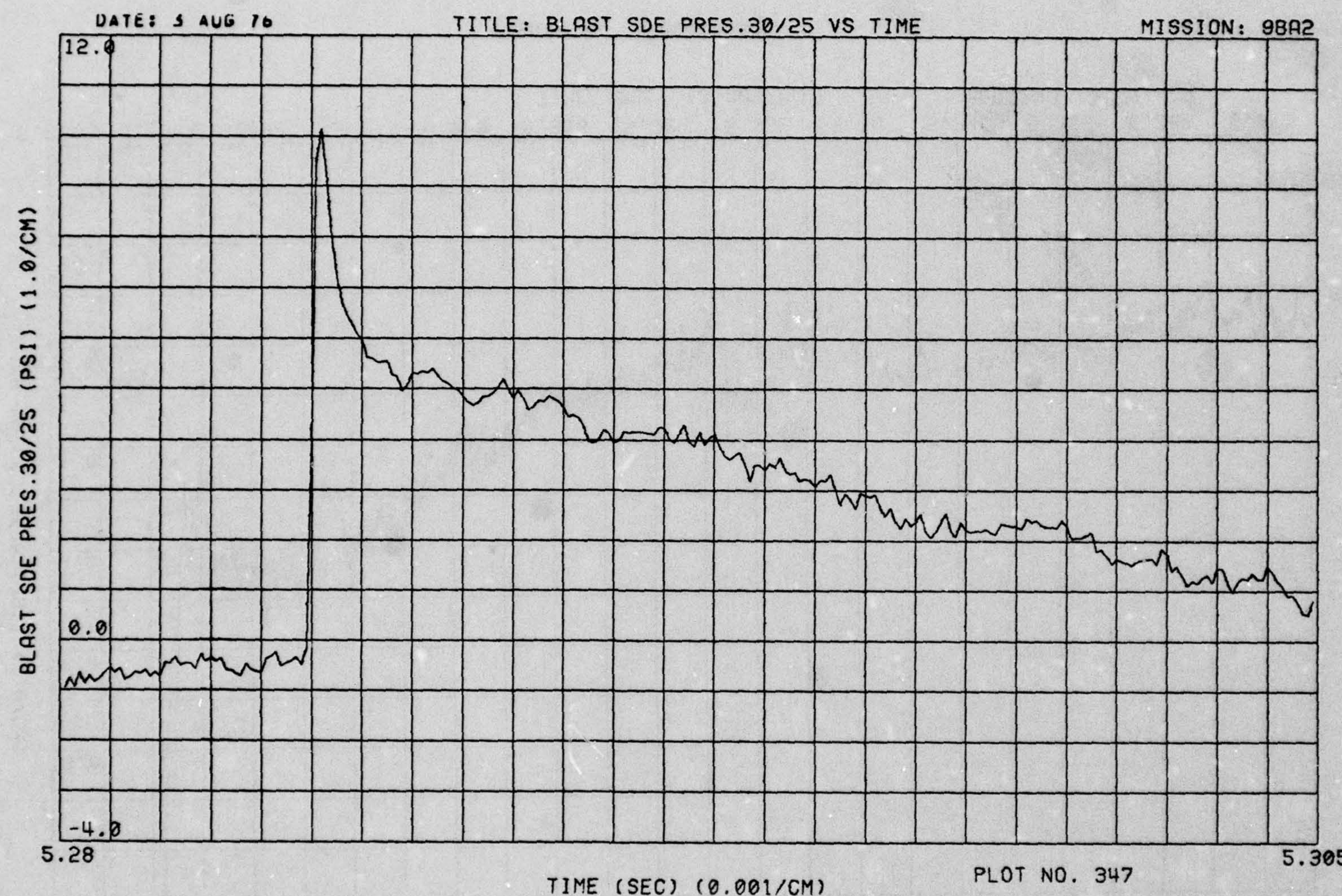


Figure 4. (Continued)

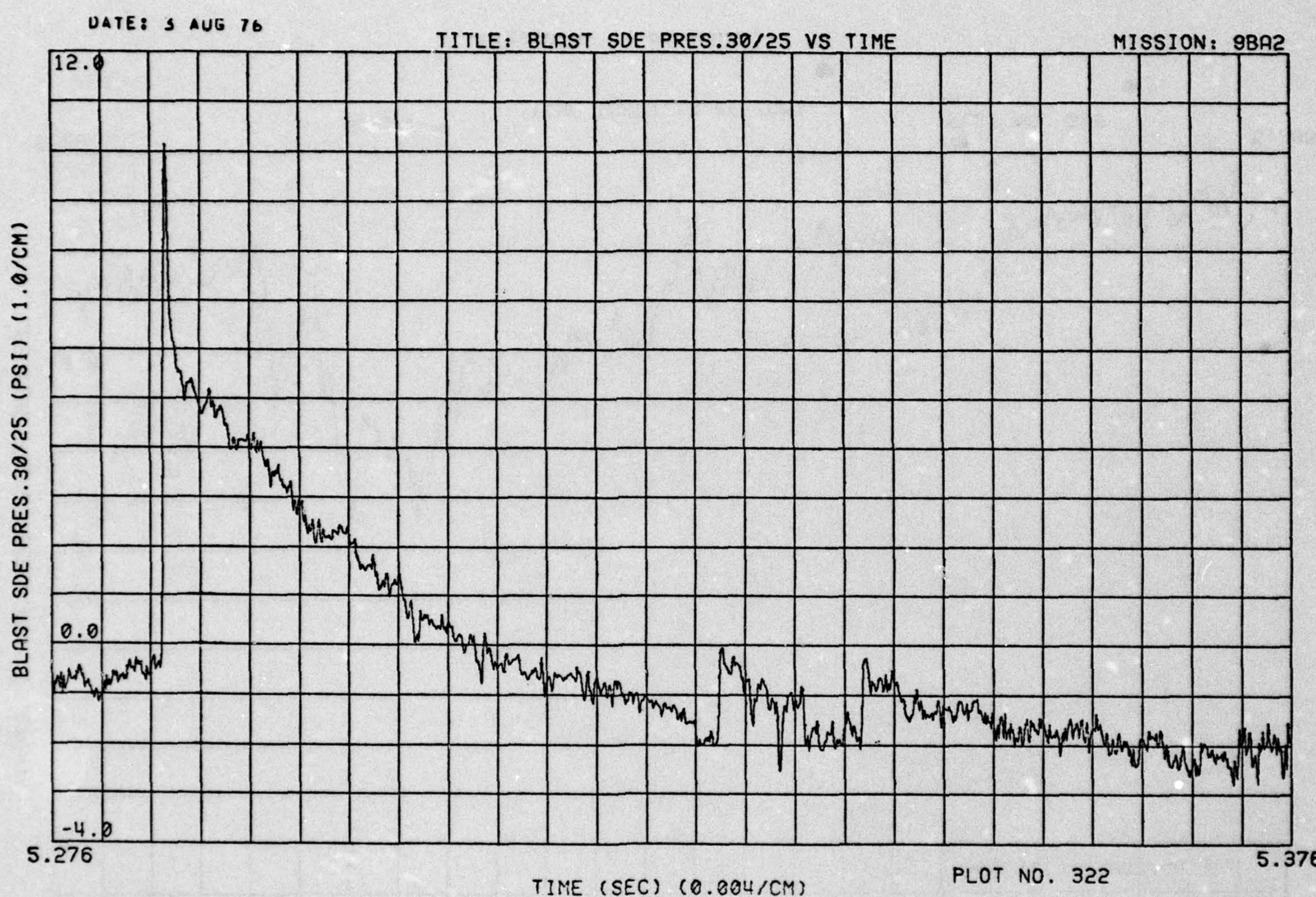


Figure 4. (Continued)

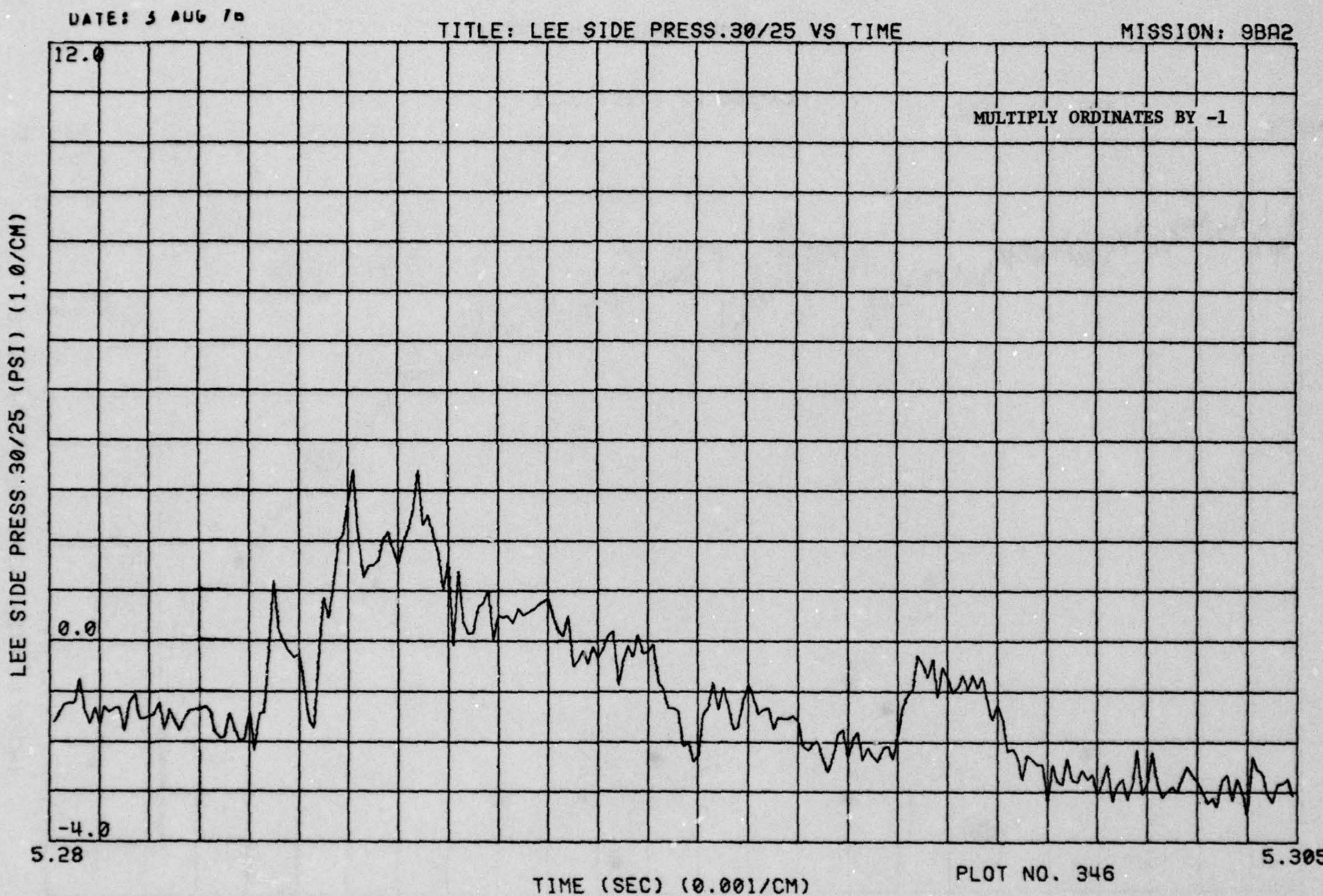


Figure 4. (Continued)

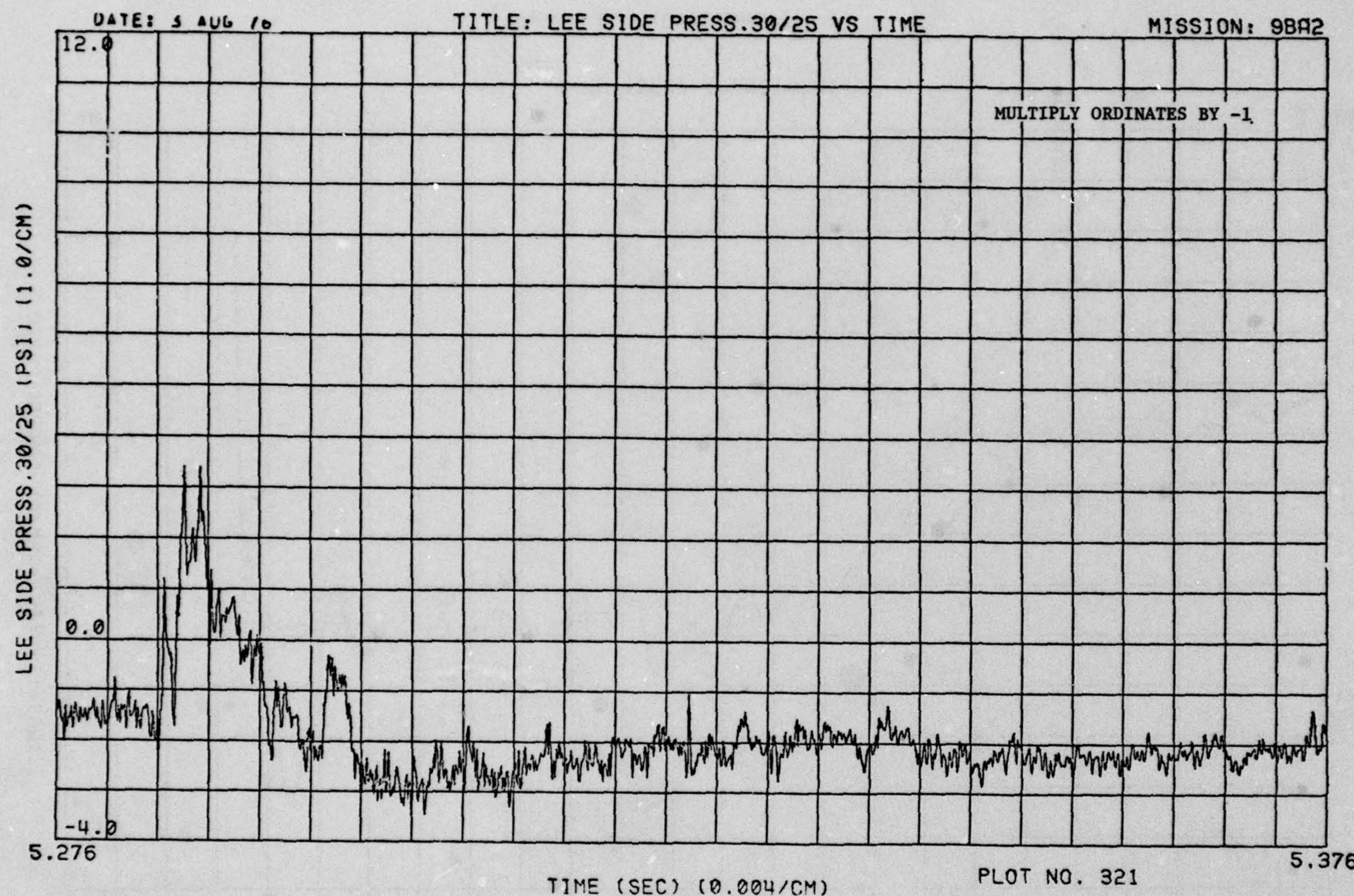


Figure 4. (Continued)

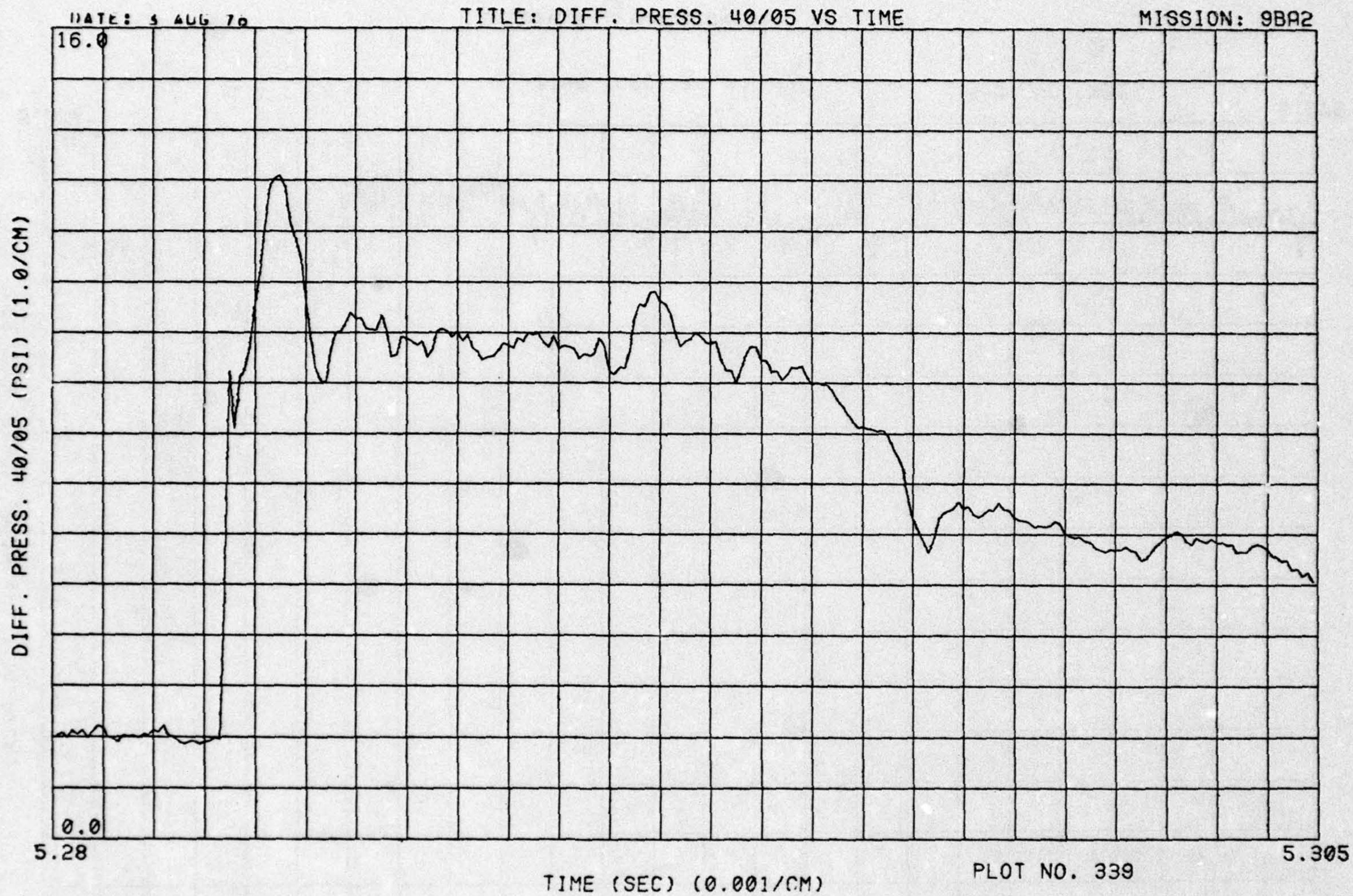


Figure 4. (Continued)

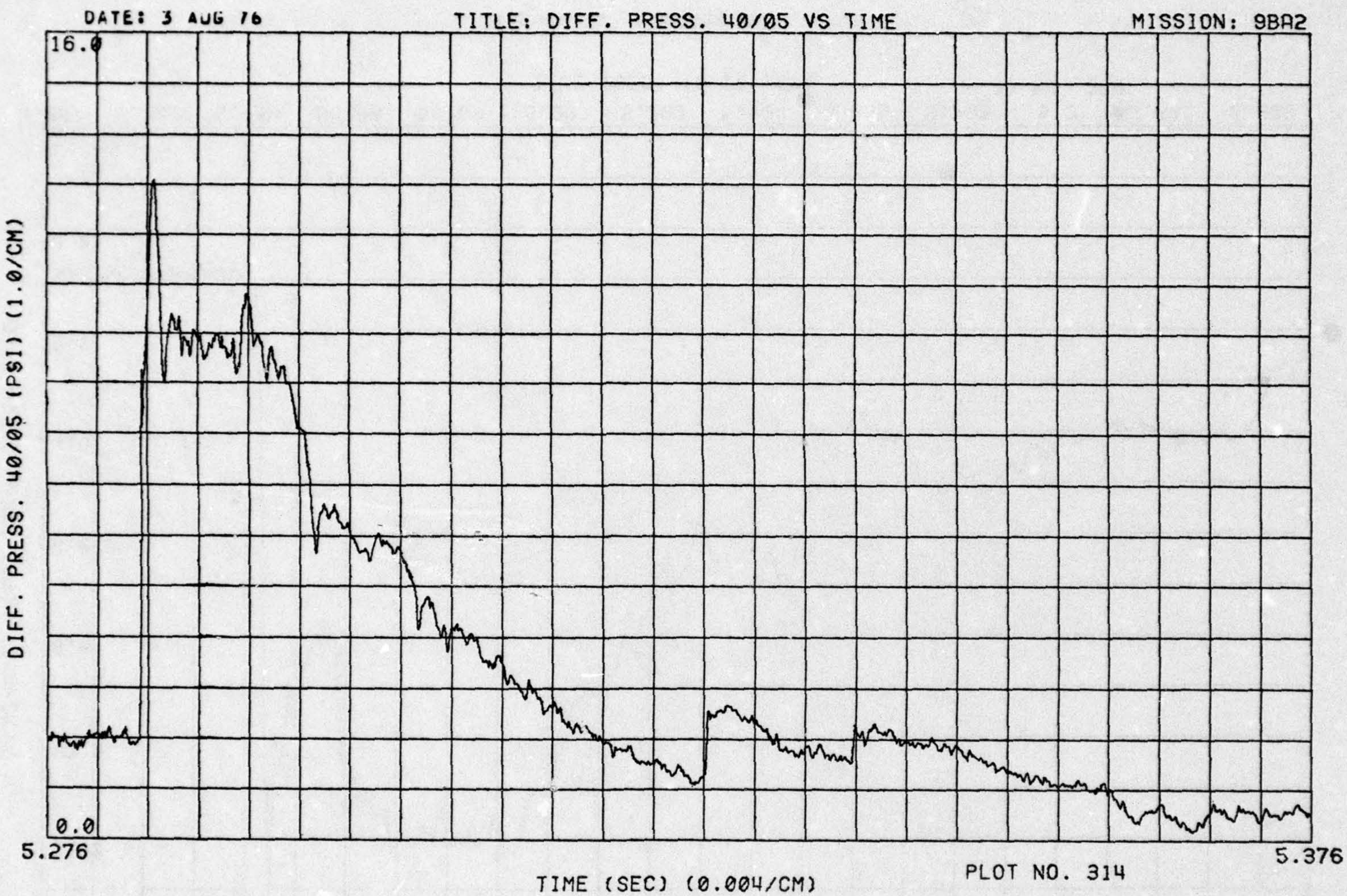


Figure 4. (Continued)

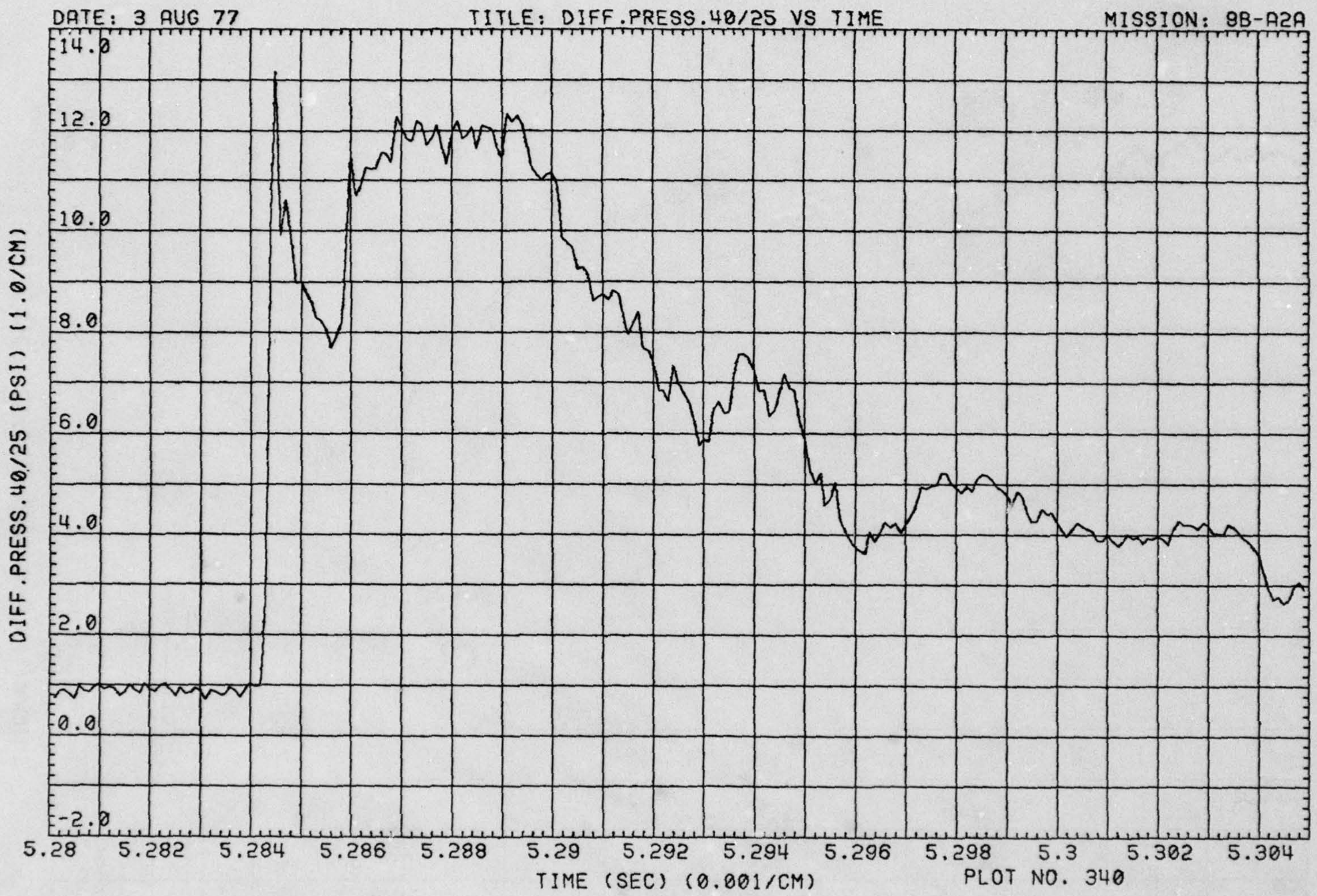


Figure 4. (Continued)

Figure 4. (Continued)

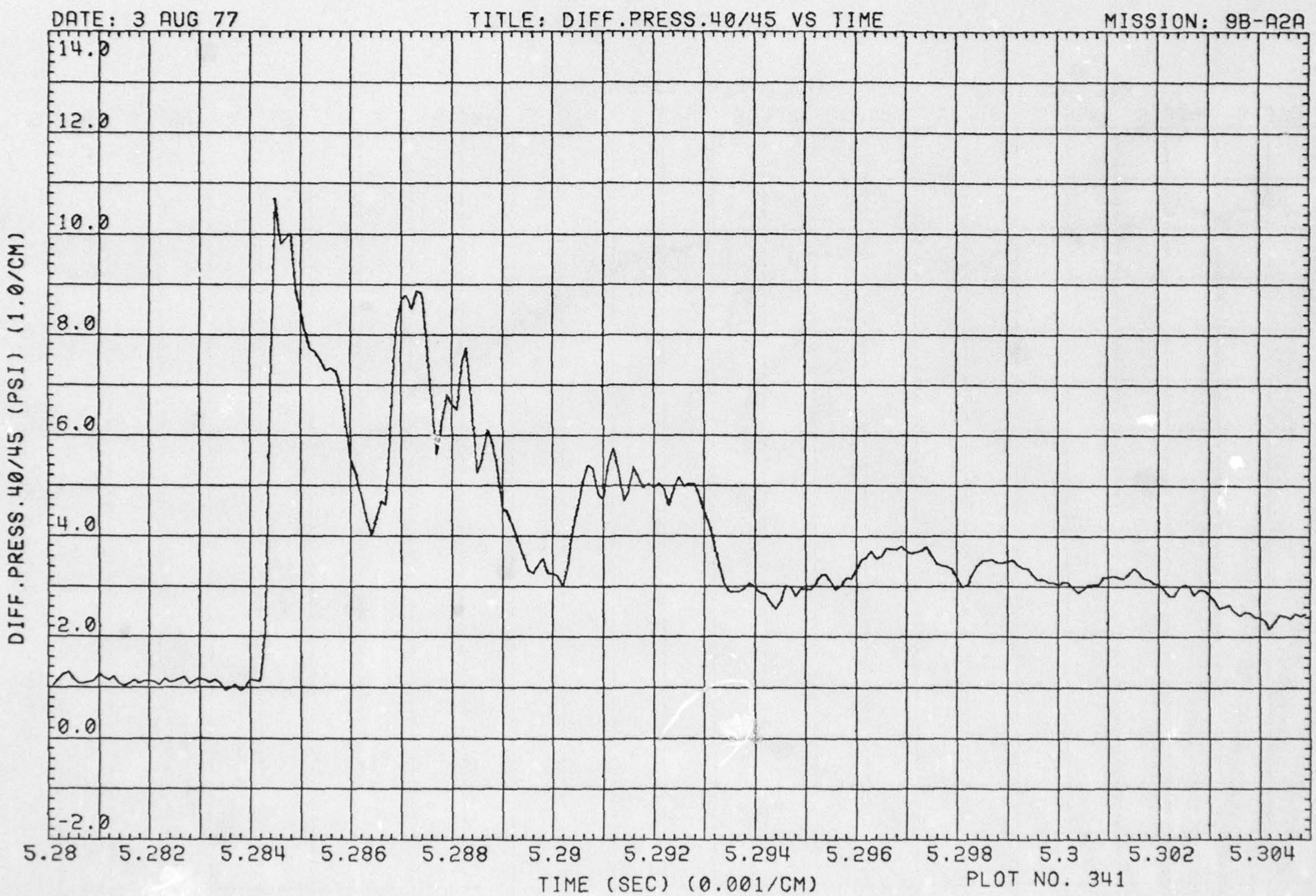


Figure 4. (Continued)

Figure 4. (Continued)

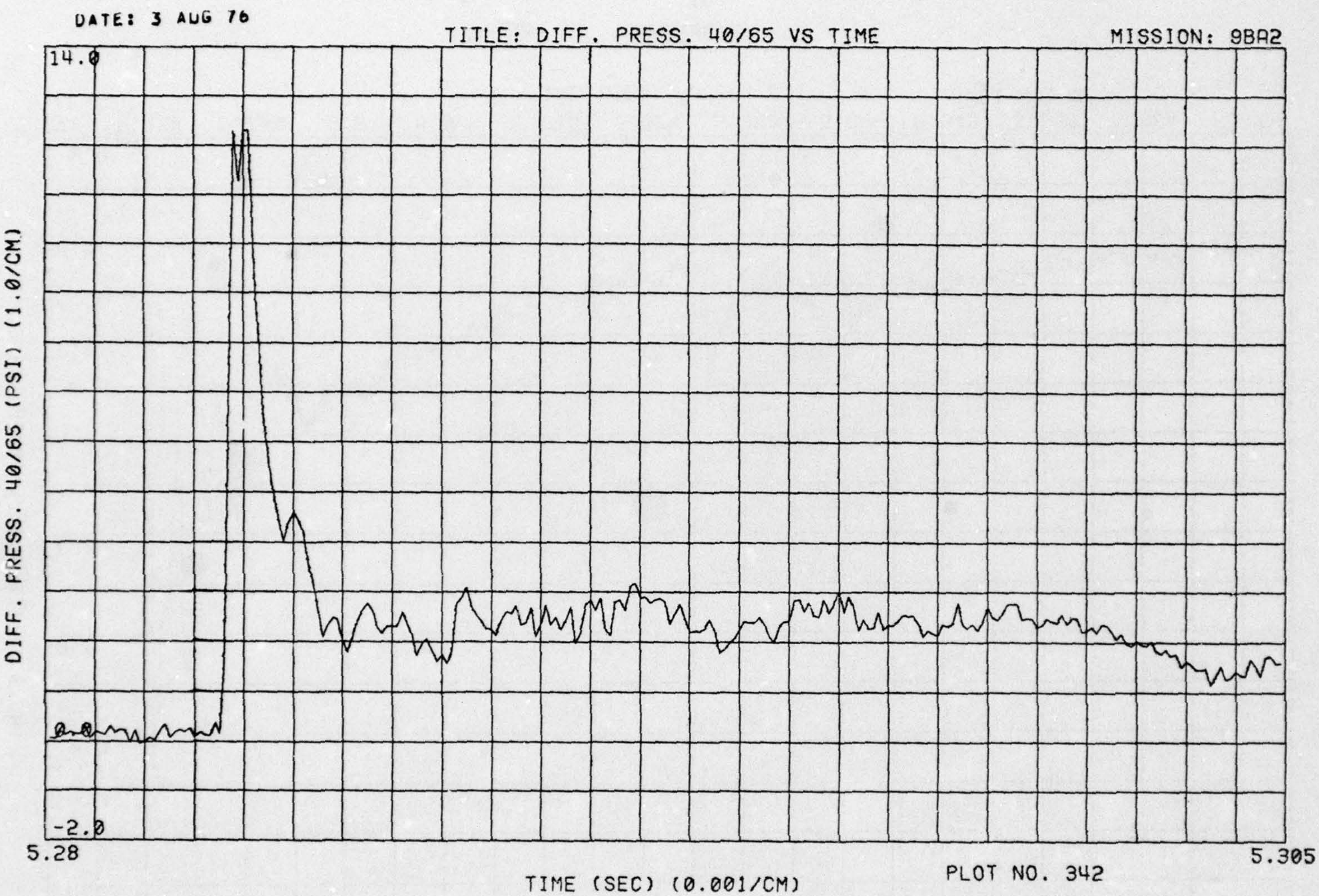


Figure 4. (Continued)

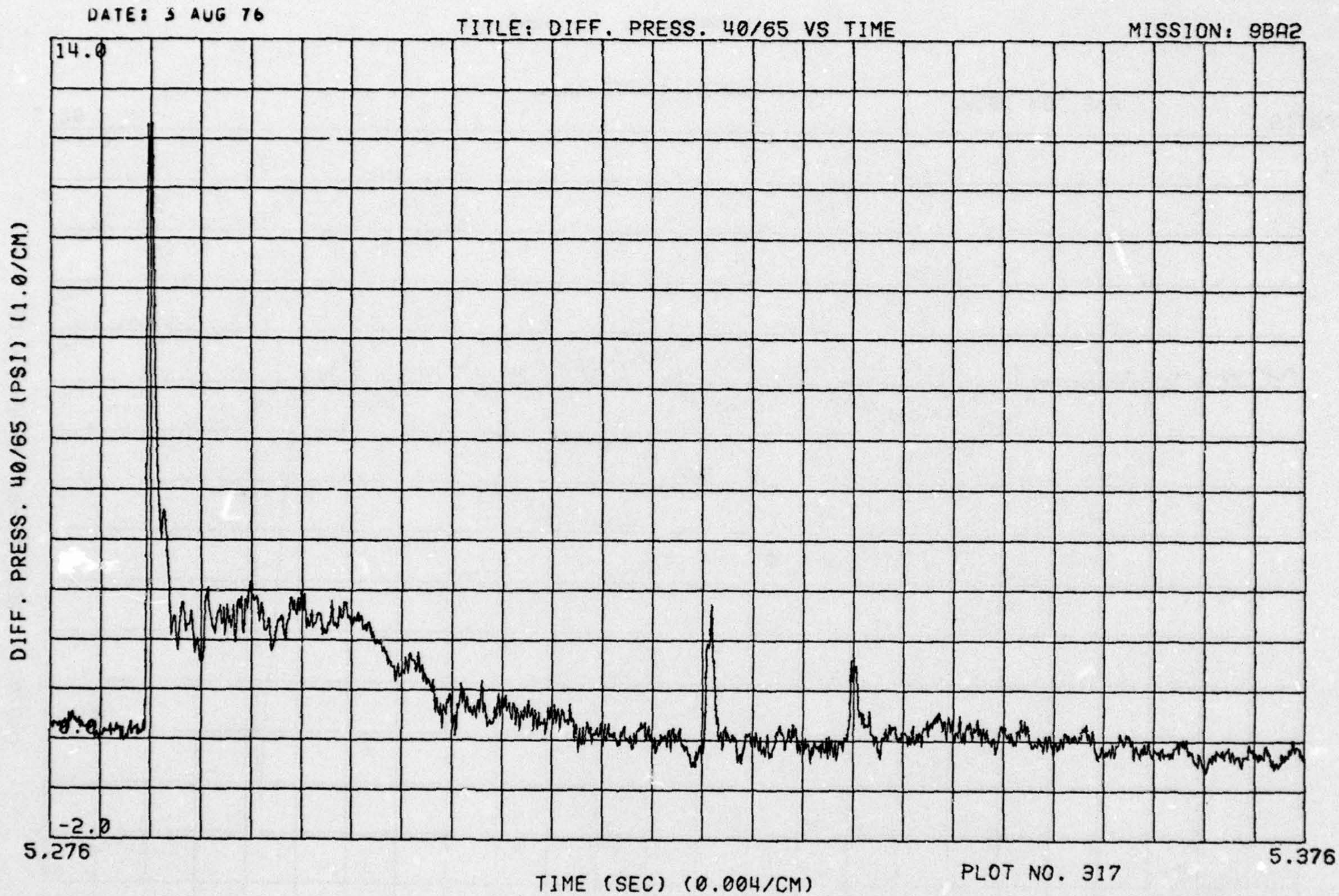


Figure 4. (Continued)

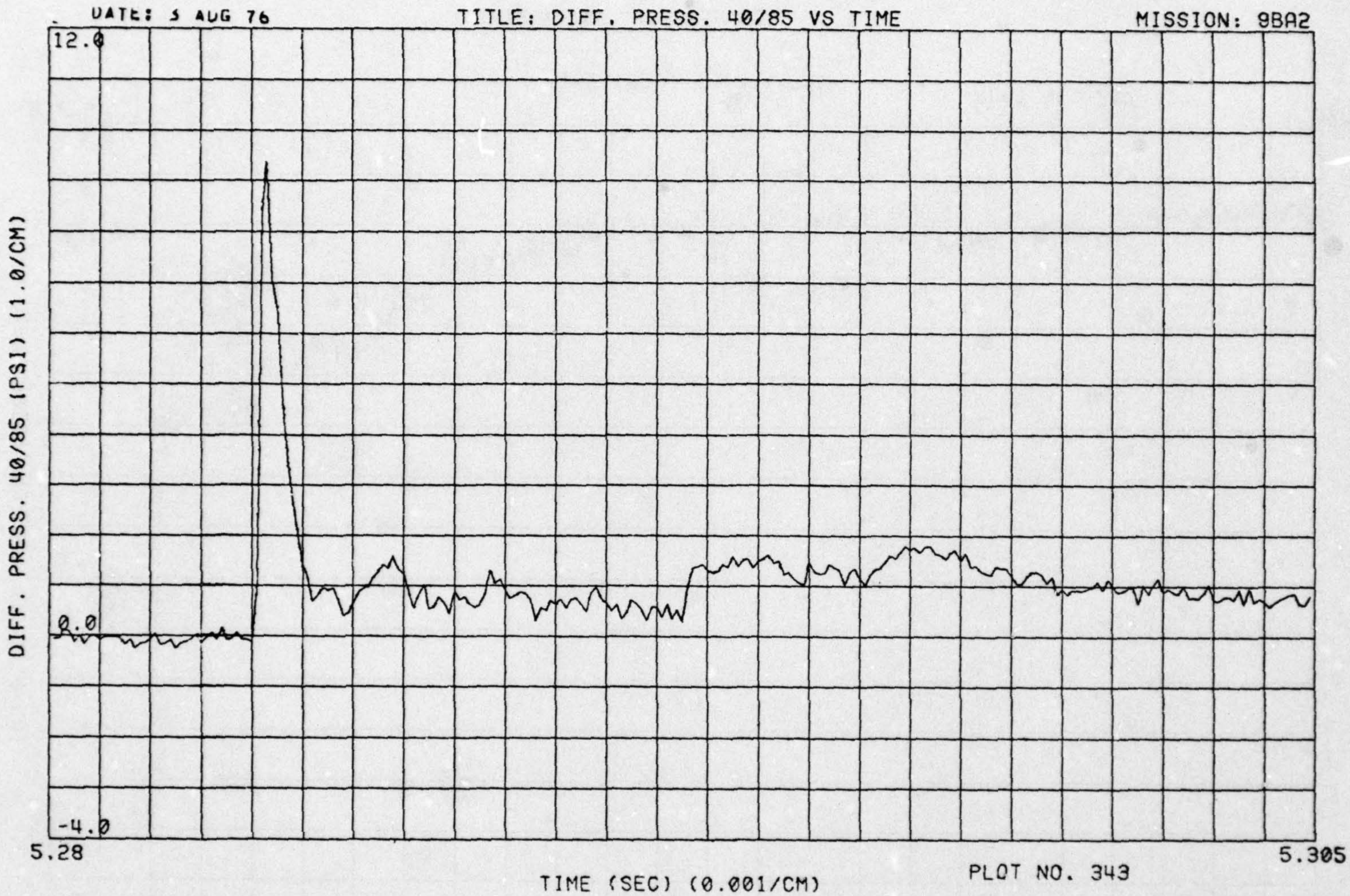


Figure 4. (Continued)

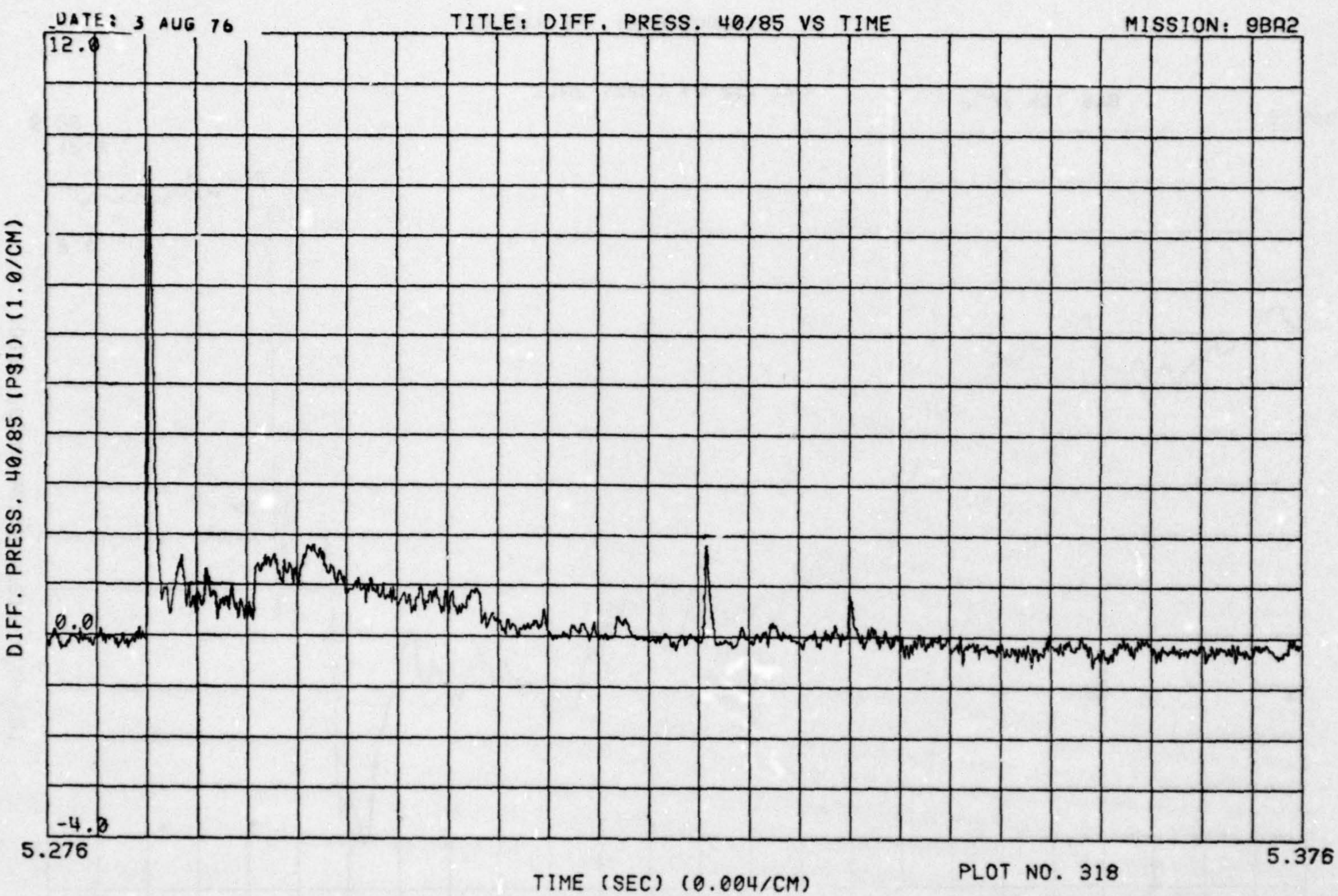


Figure 4. (Continued)

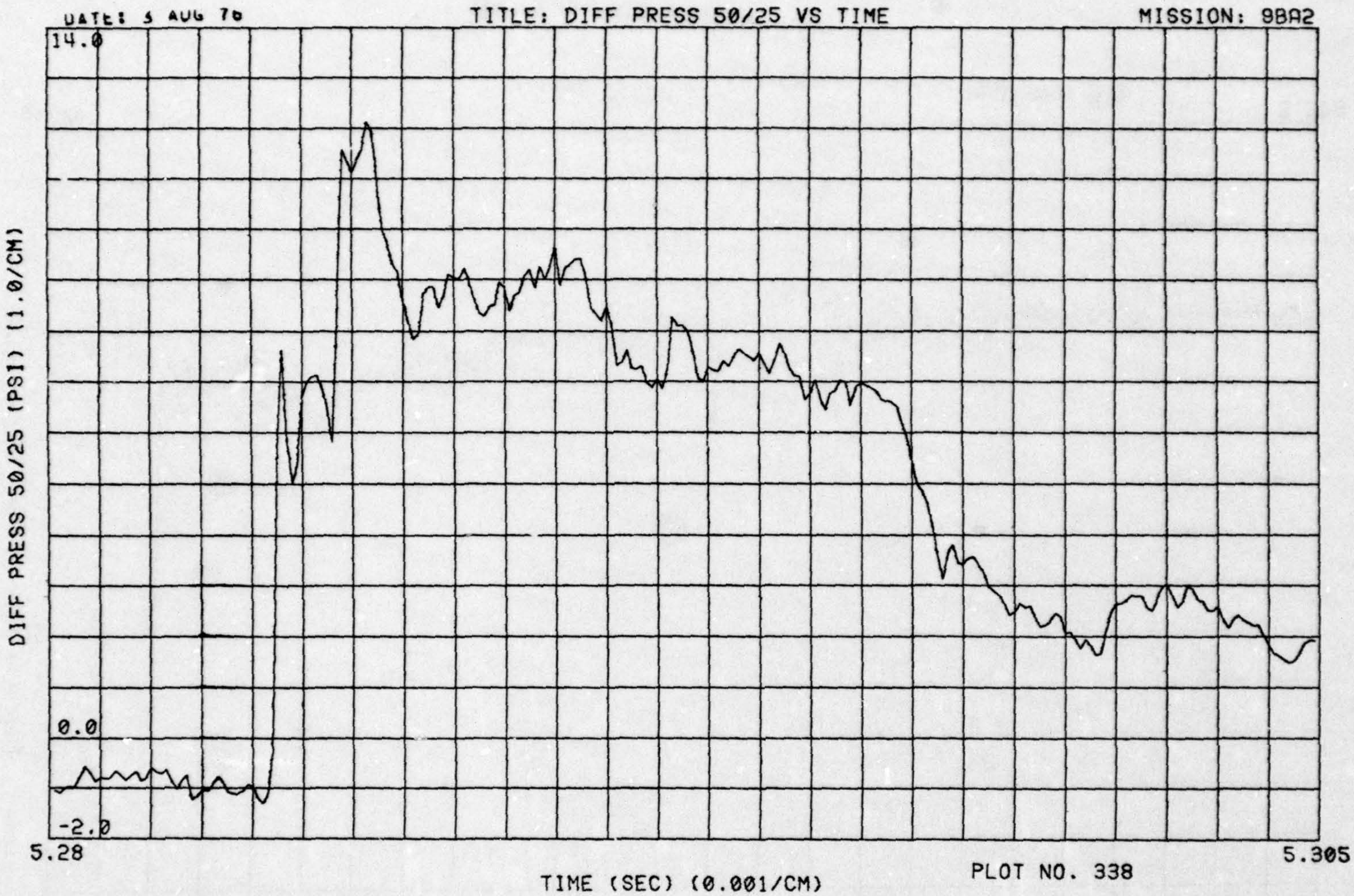


Figure 4. (Continued)

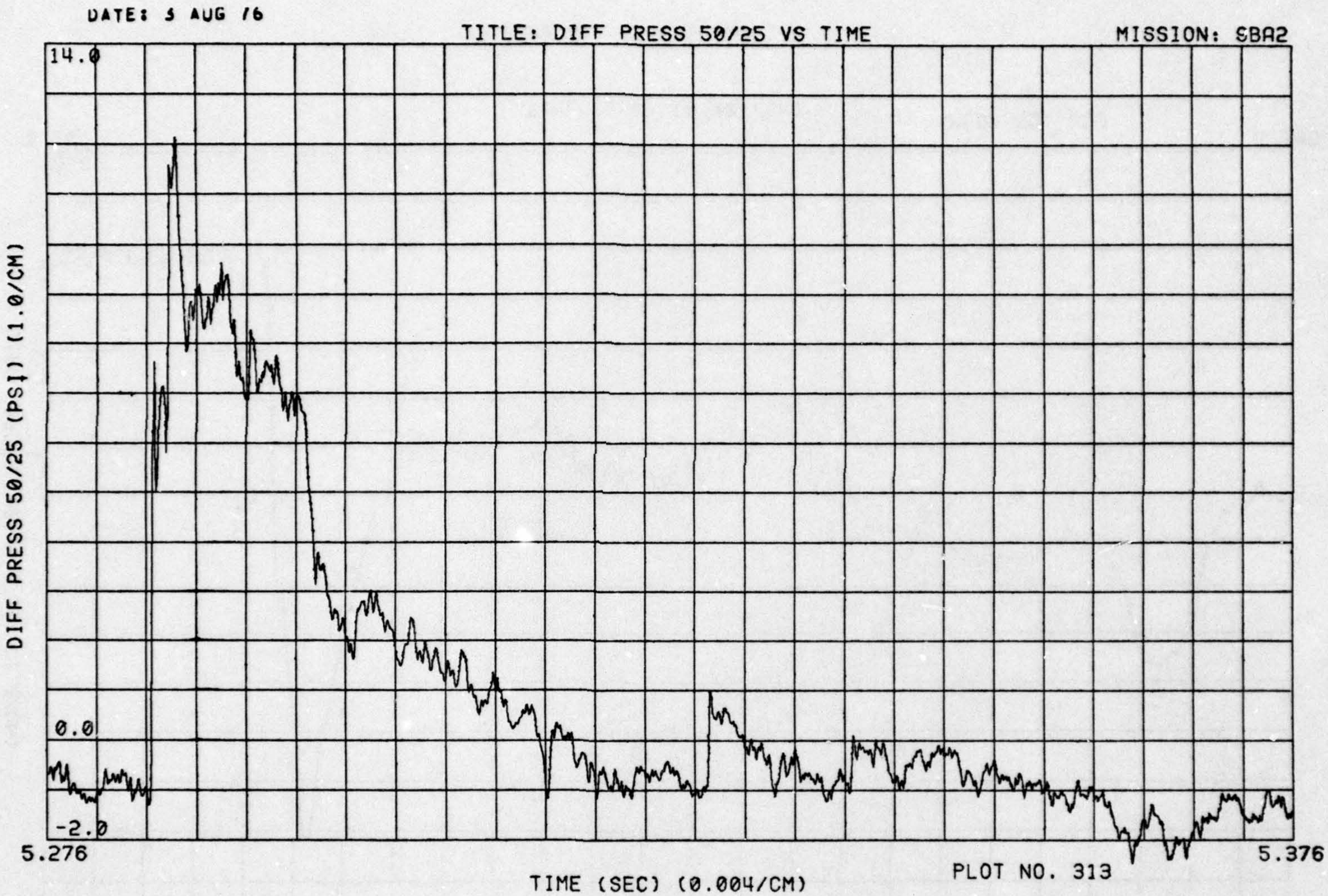


Figure 4. (Continued)

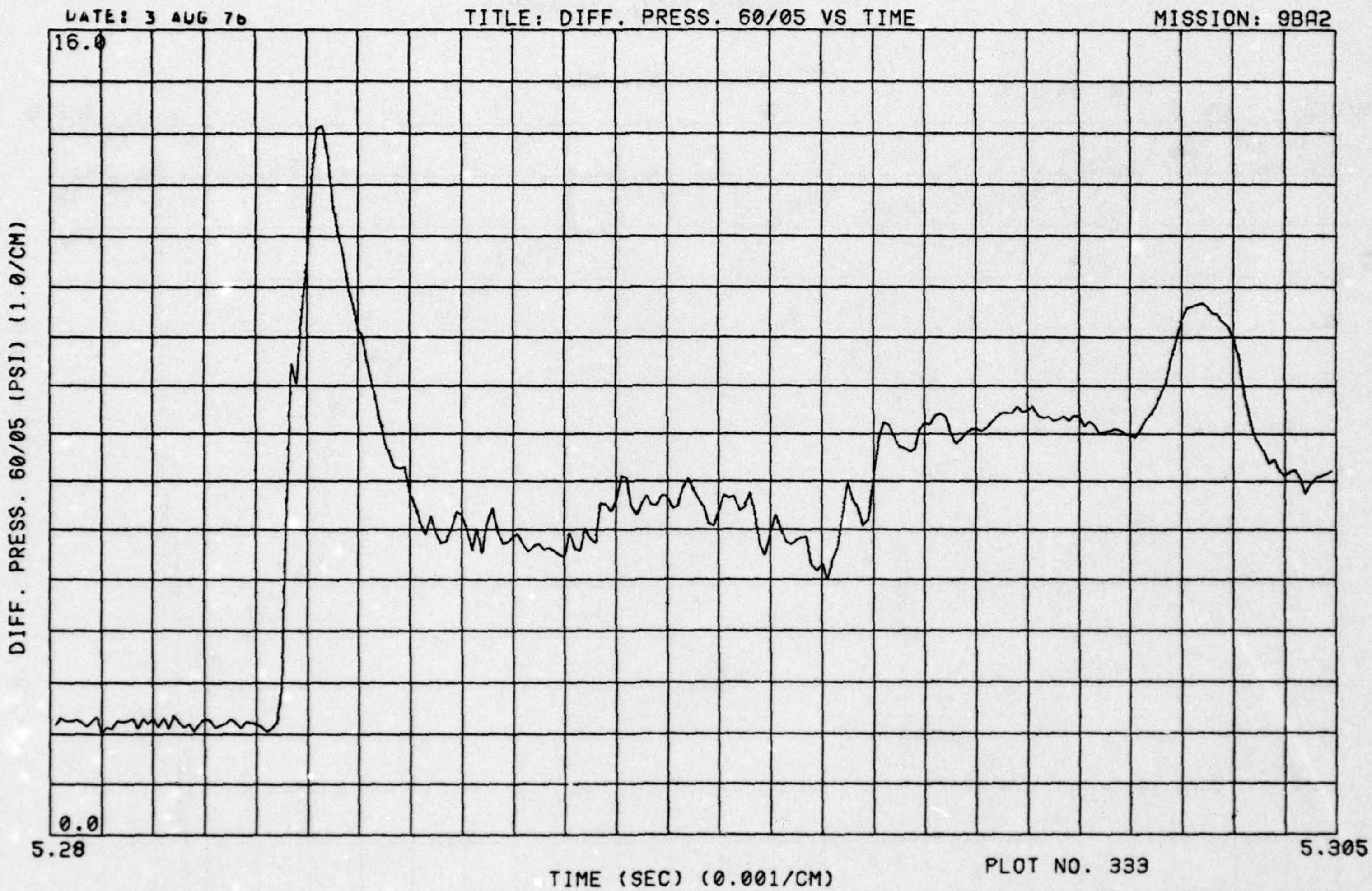


Figure 4. (Continued)

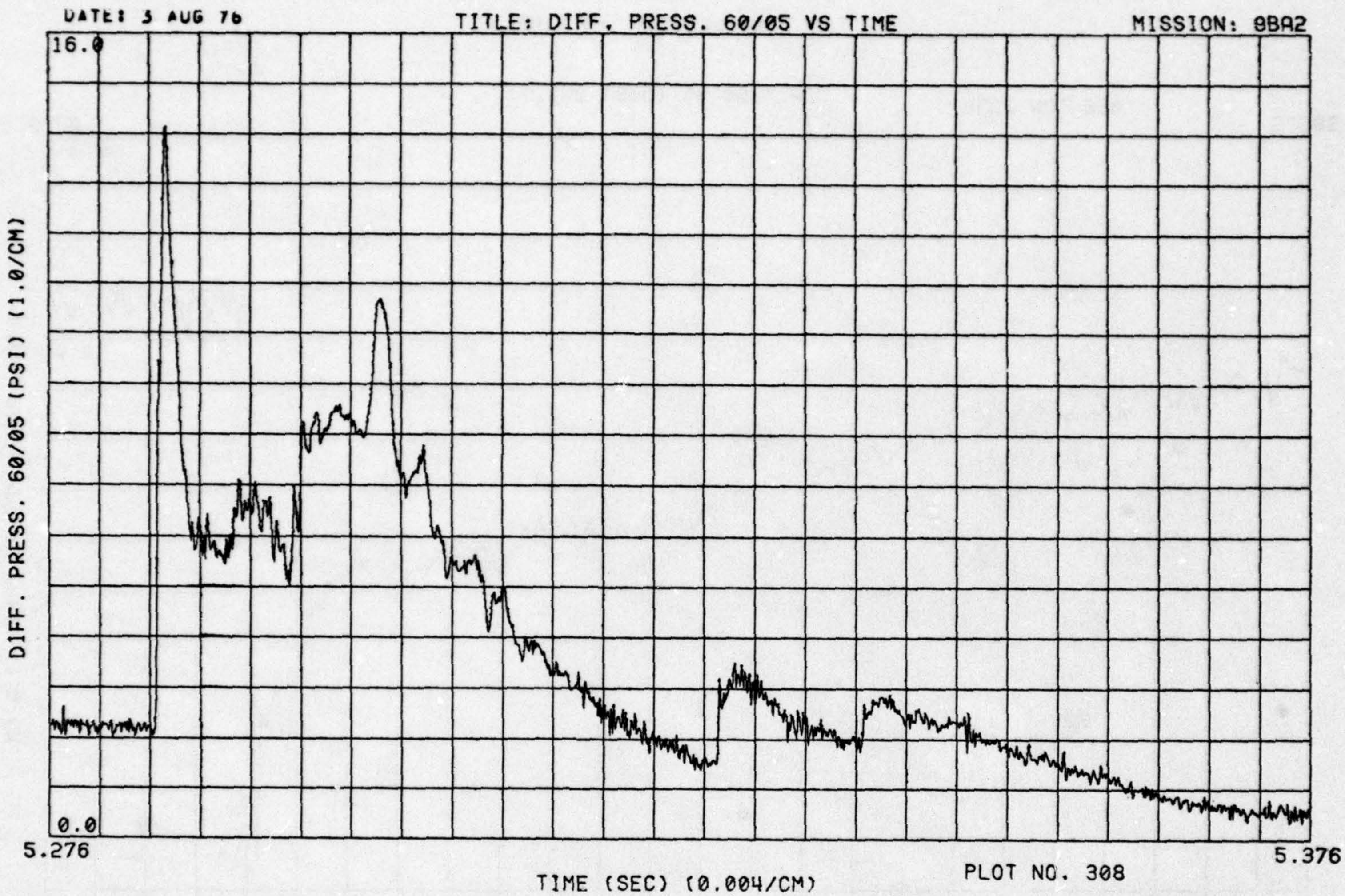


Figure 4. (Continued)

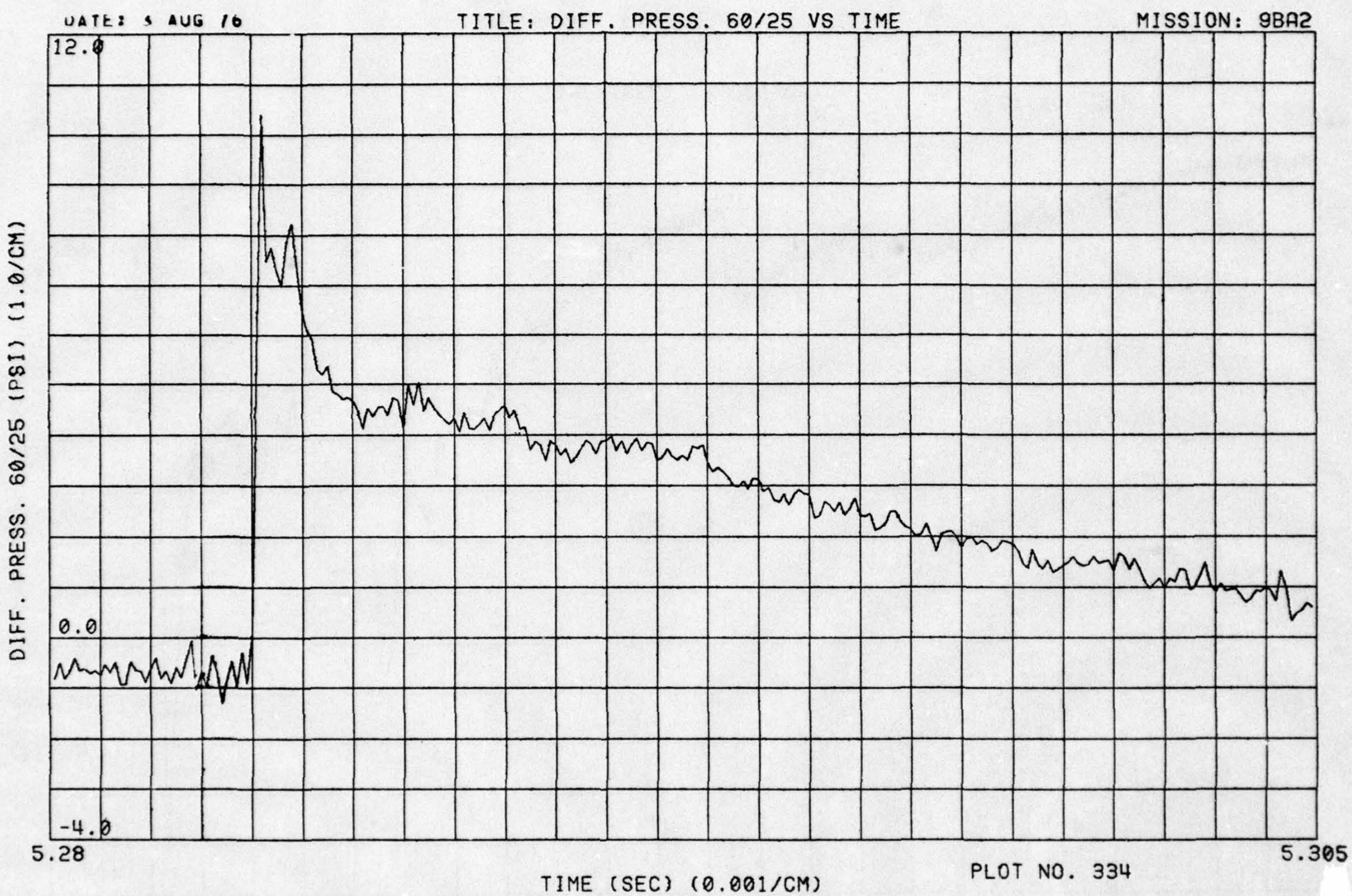


Figure 4. (Continued)

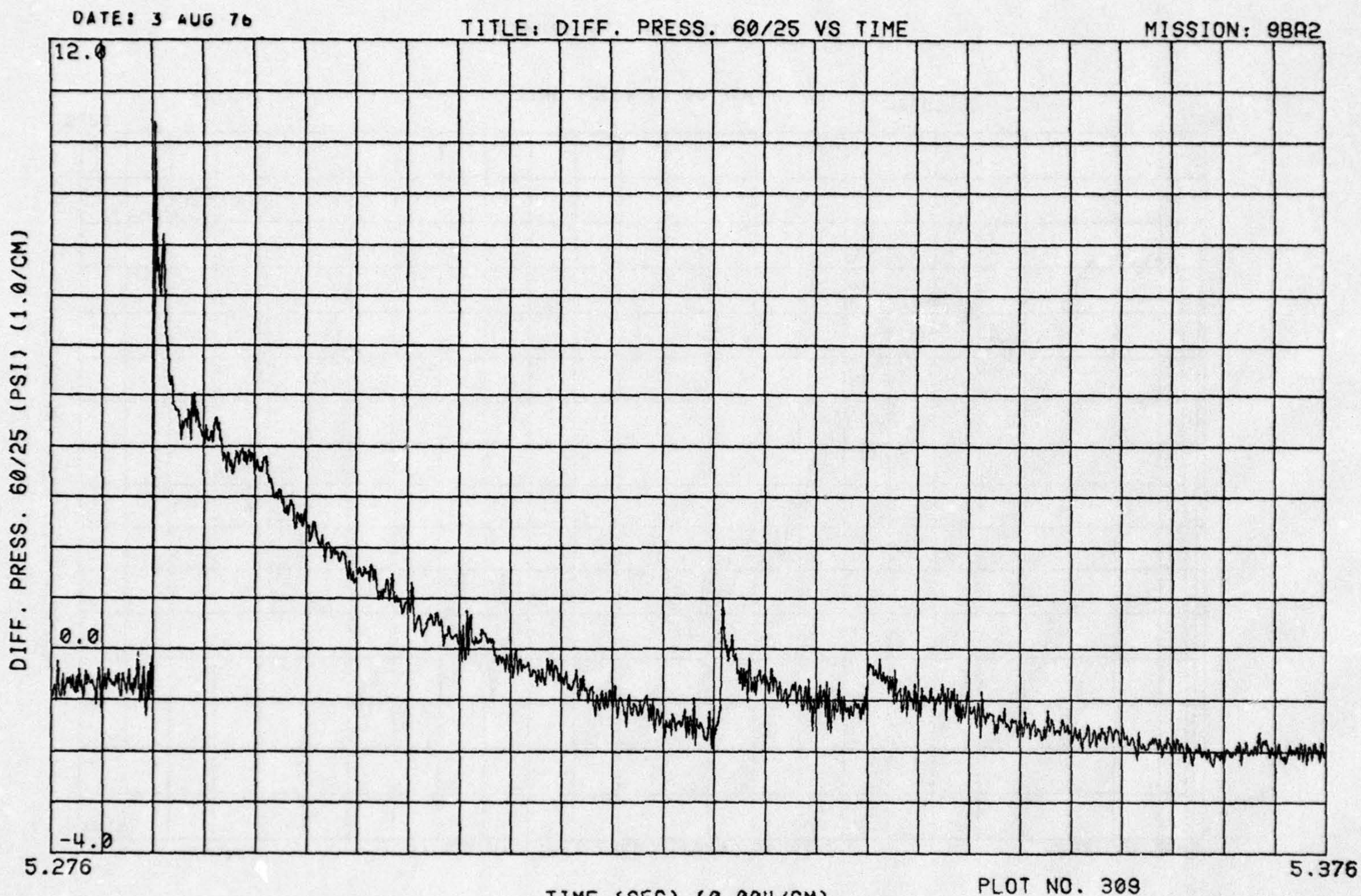


Figure 4. (Continued)

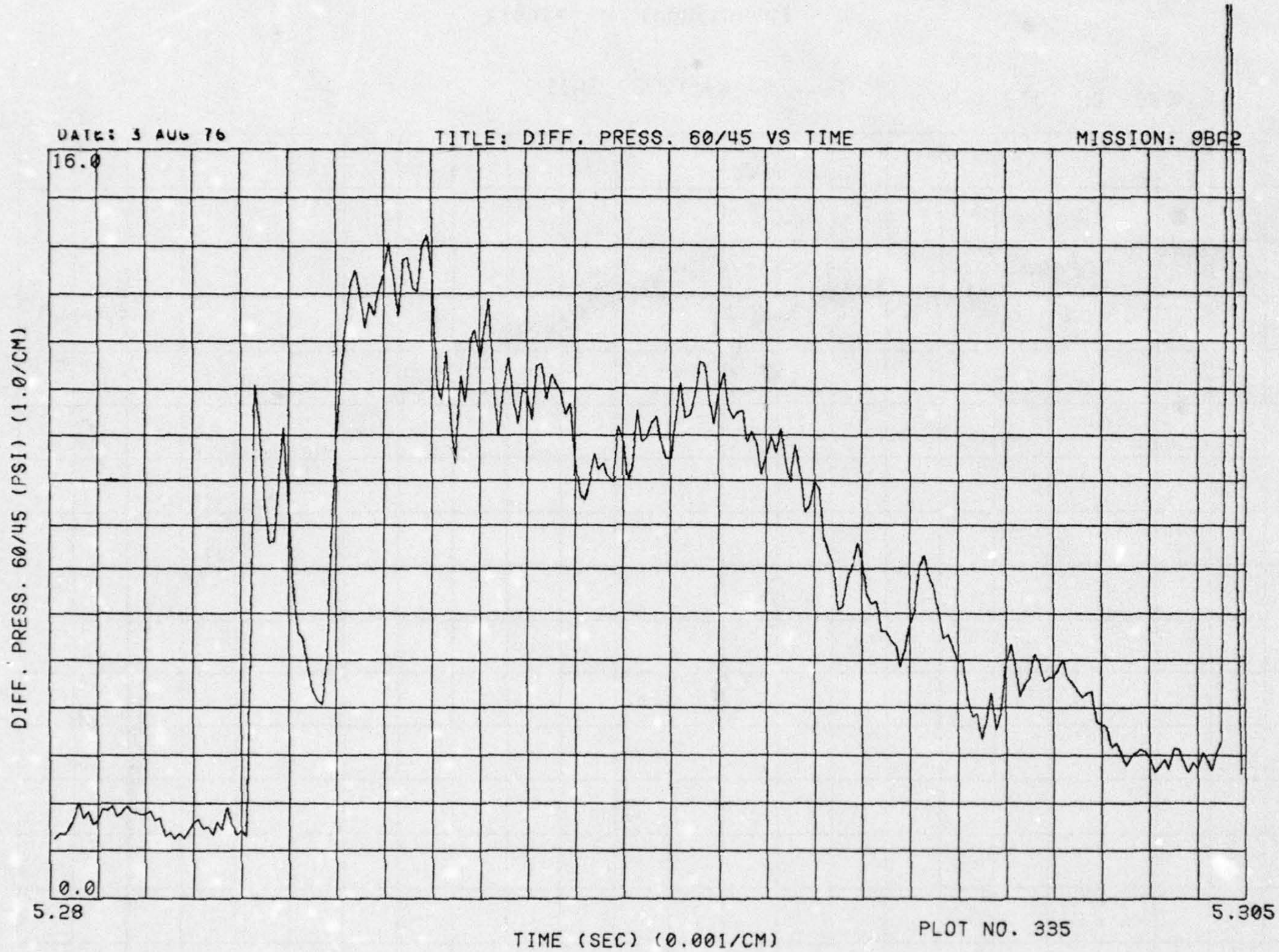


Figure 4. (Continued)

Figure 4. (Continued)

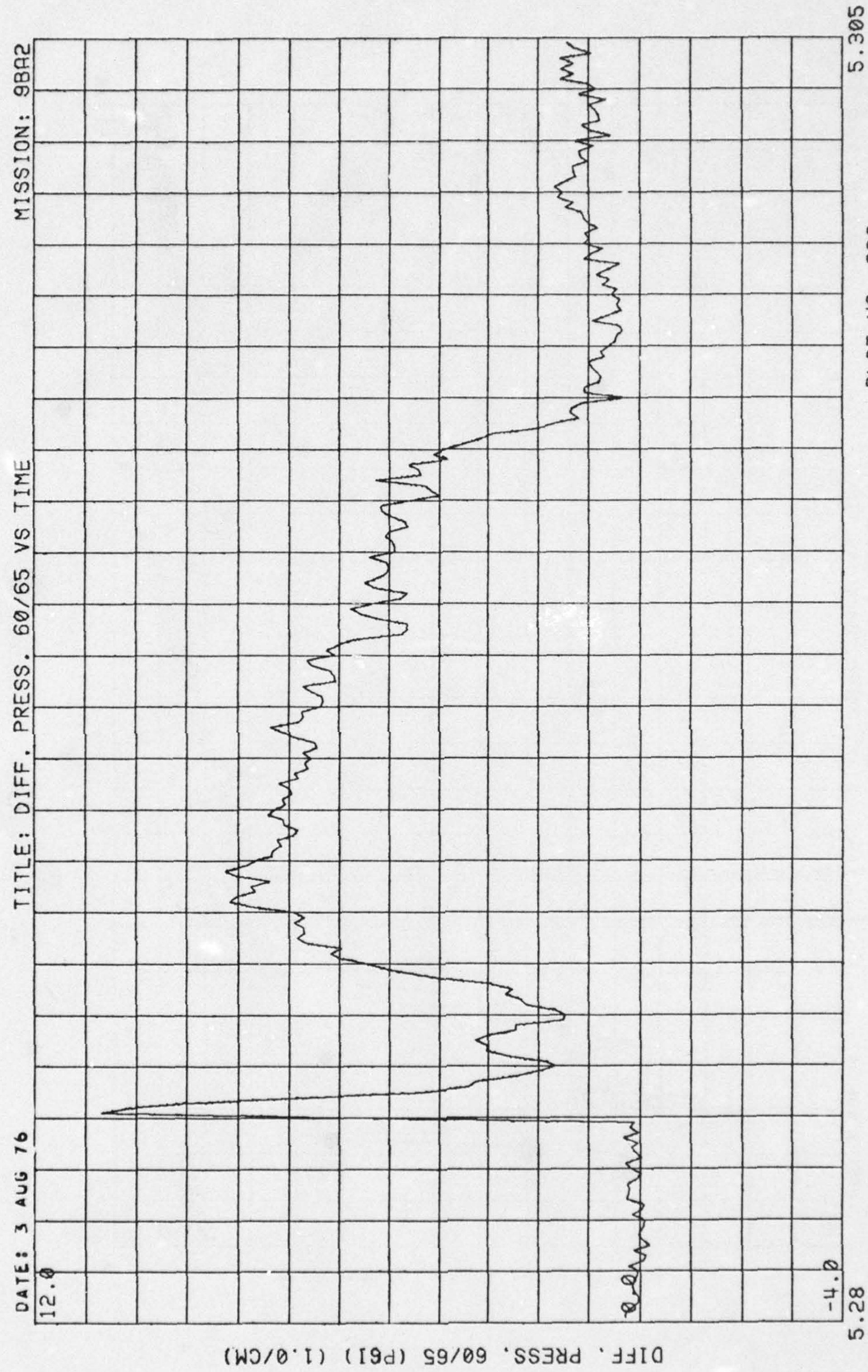


Figure 4. (Continued)

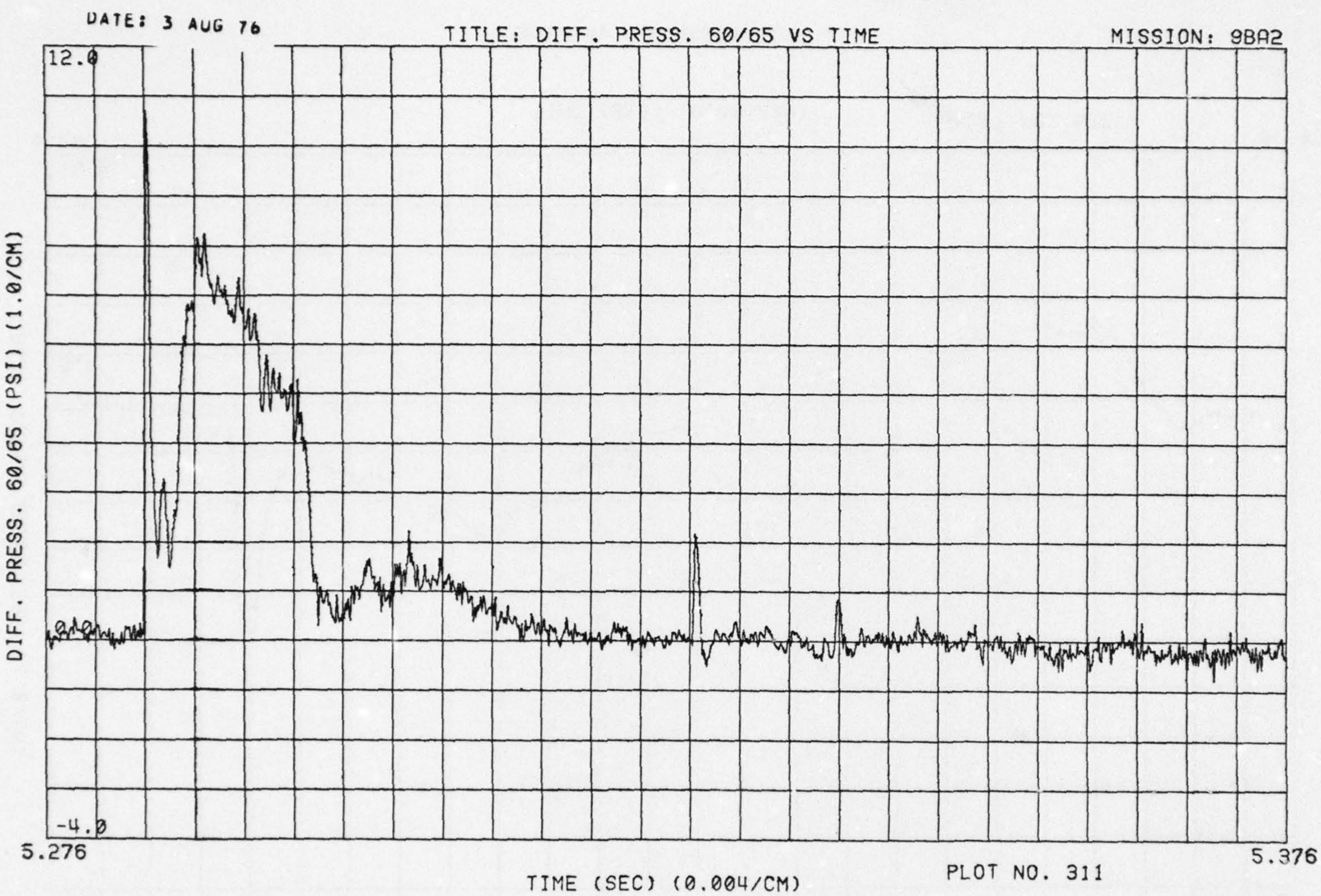


Figure 4. (Continued)

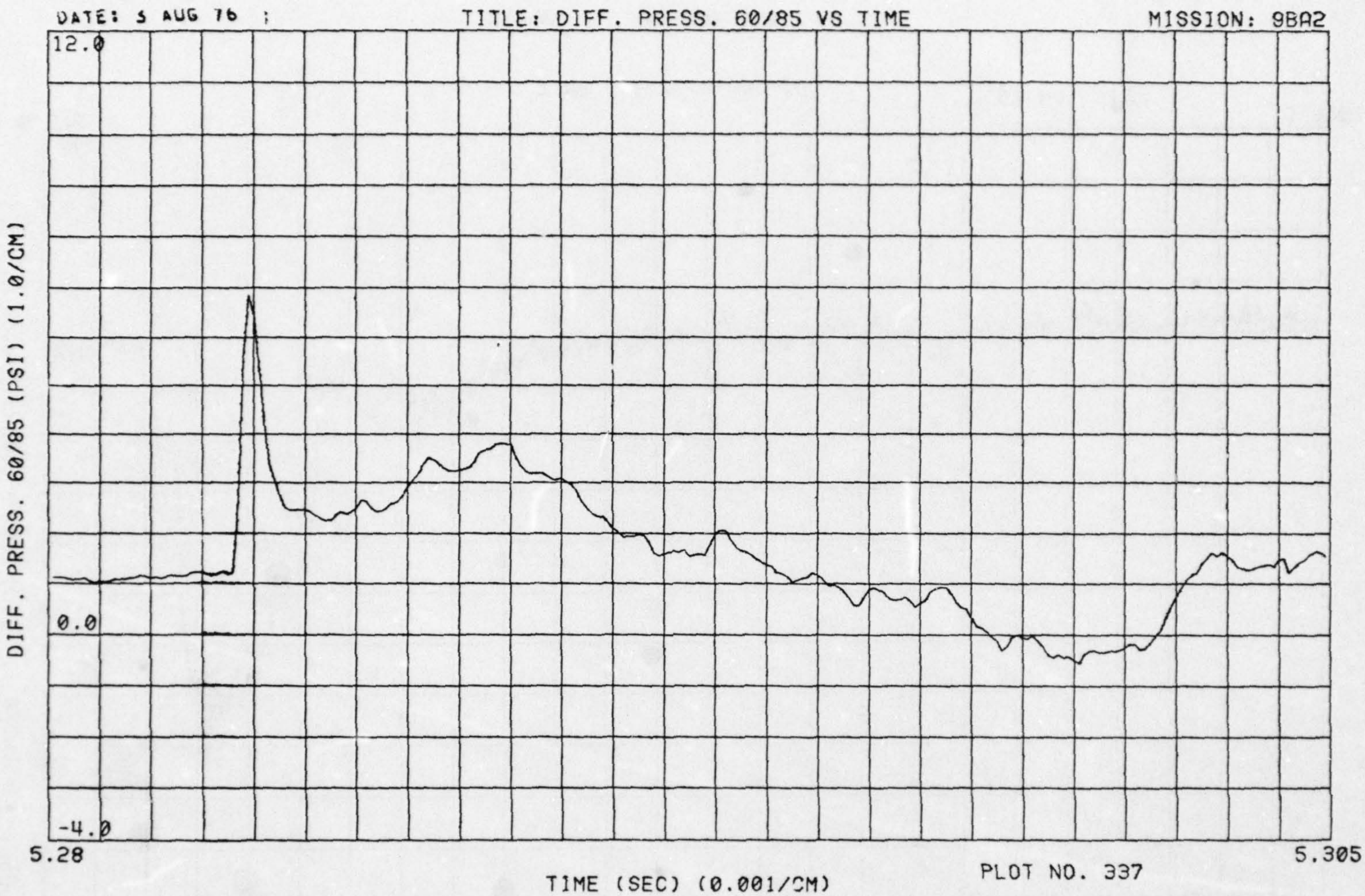


Figure 4. (Continued)

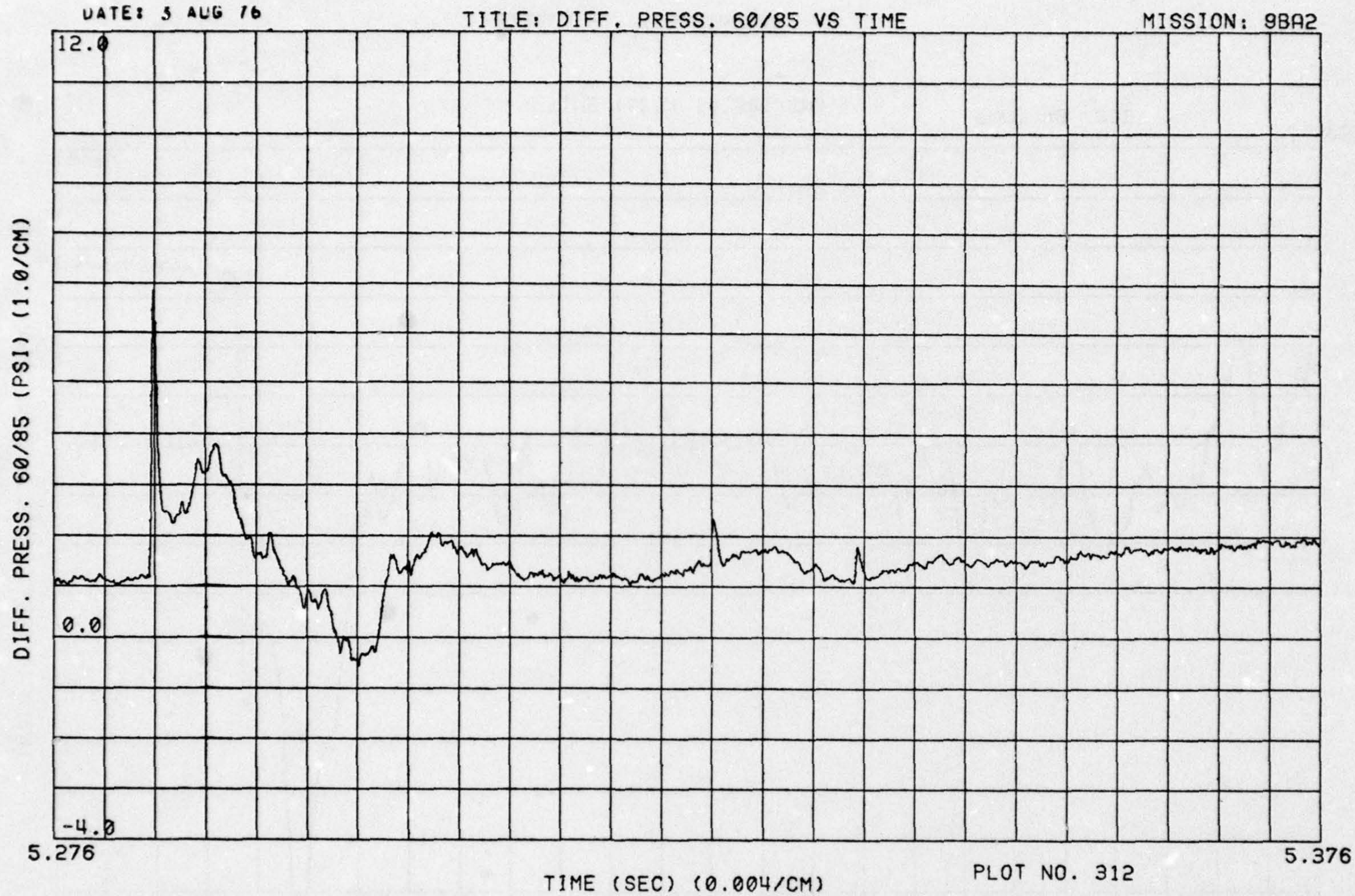


Figure 4. (Continued)

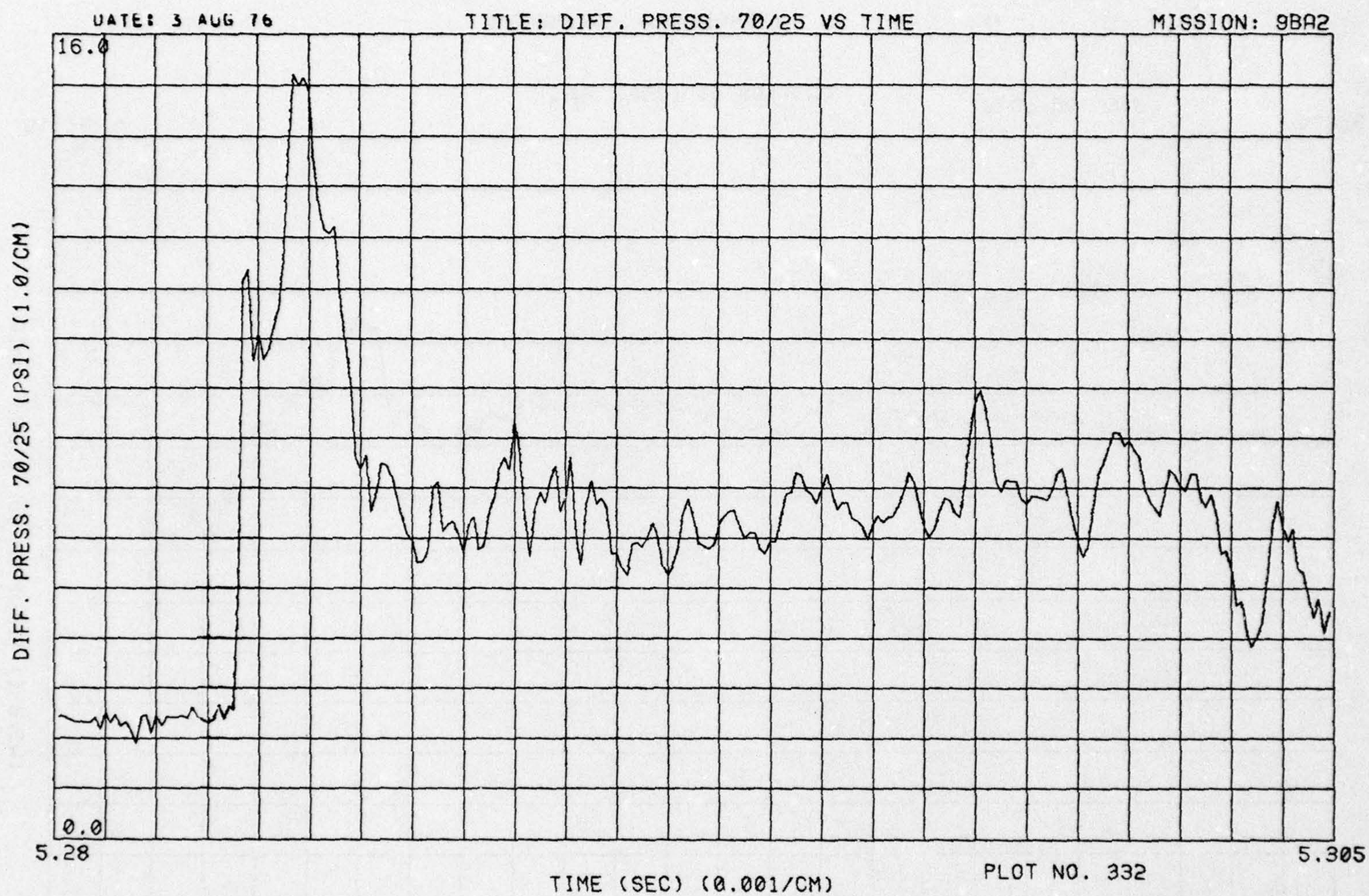


Figure 4. (Continued)

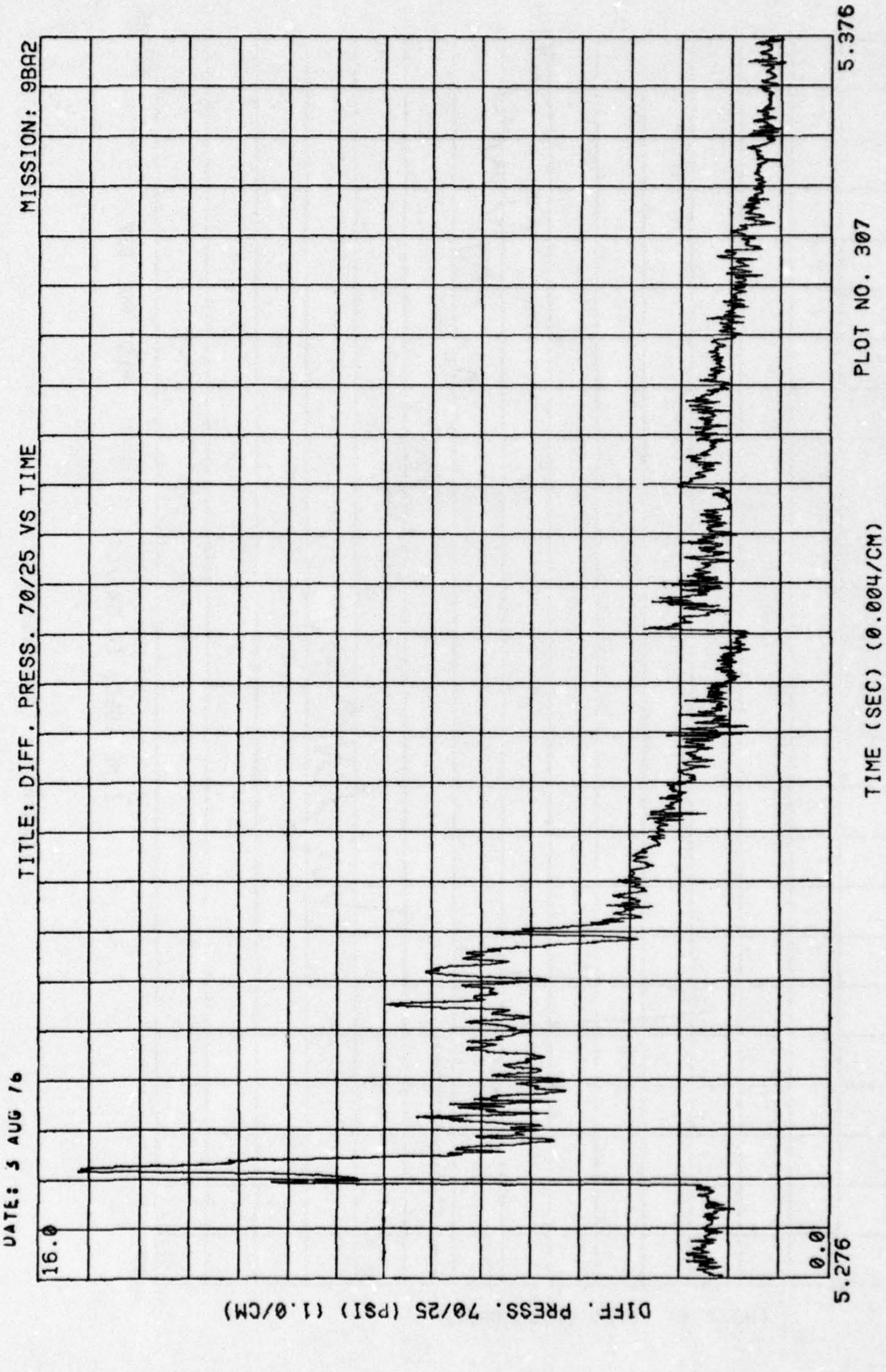


Figure 4. (Continued)

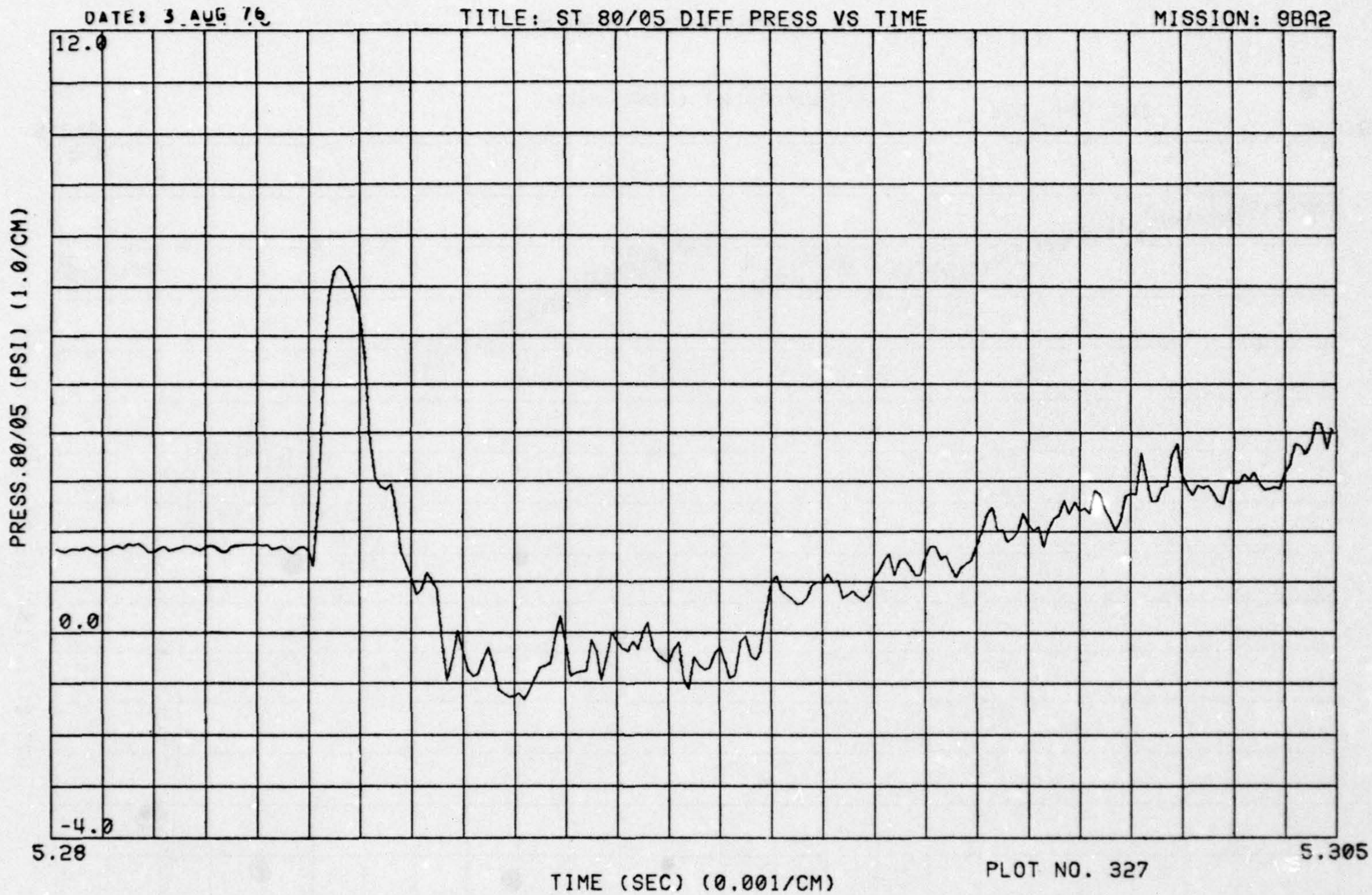


Figure 4. (Continued)

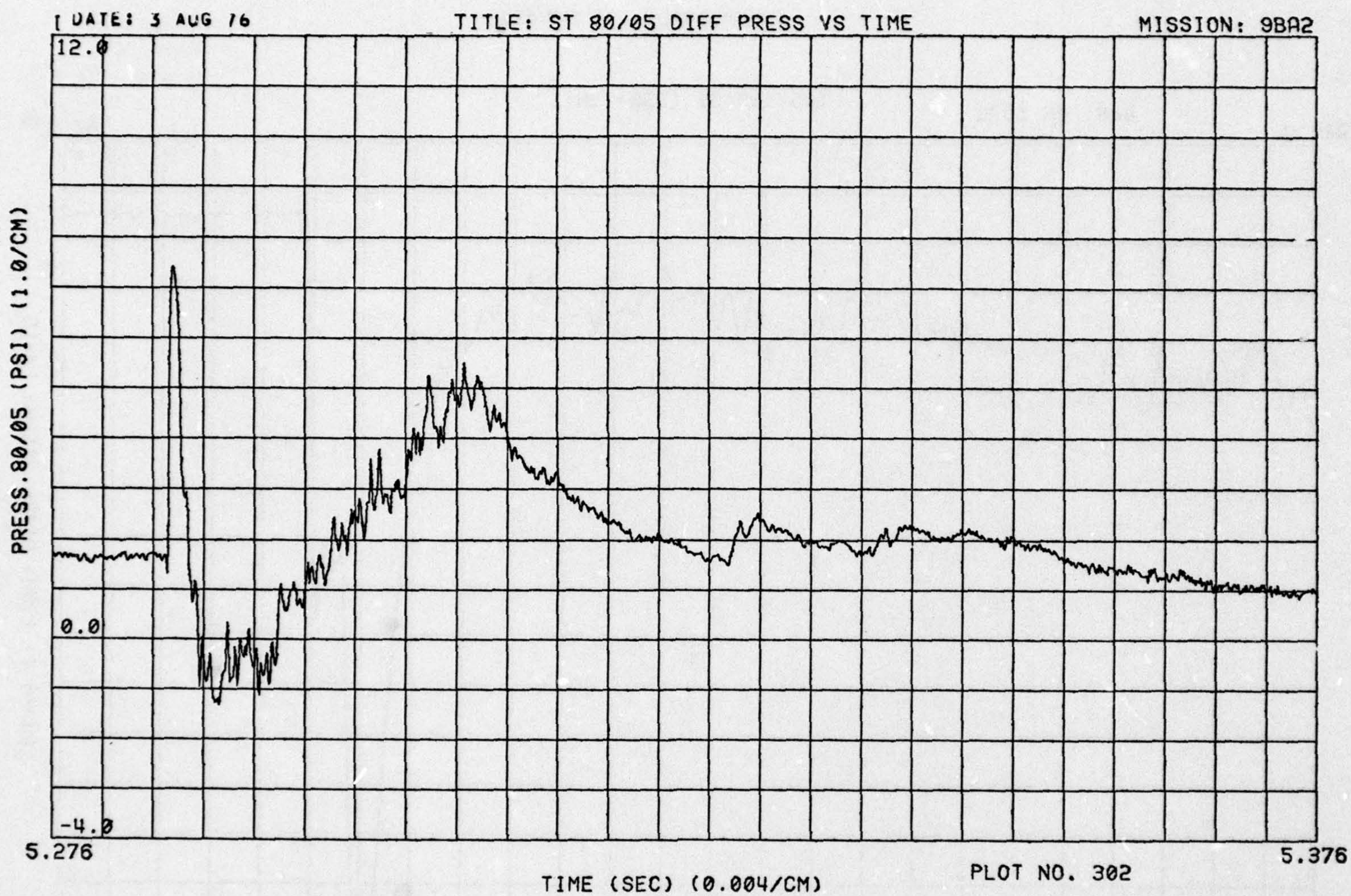


Figure 4. (Continued)

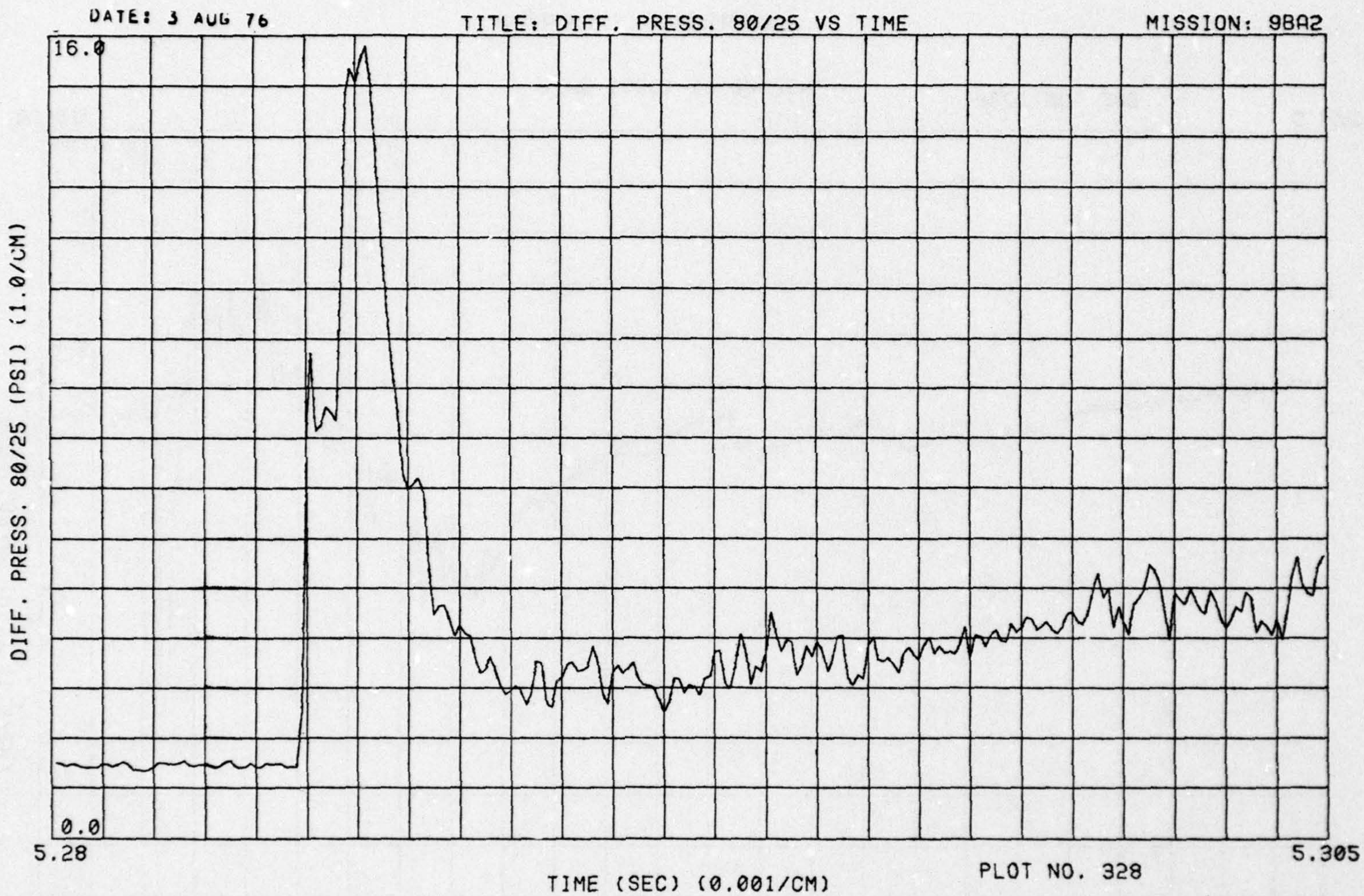


Figure 4. (Continued)

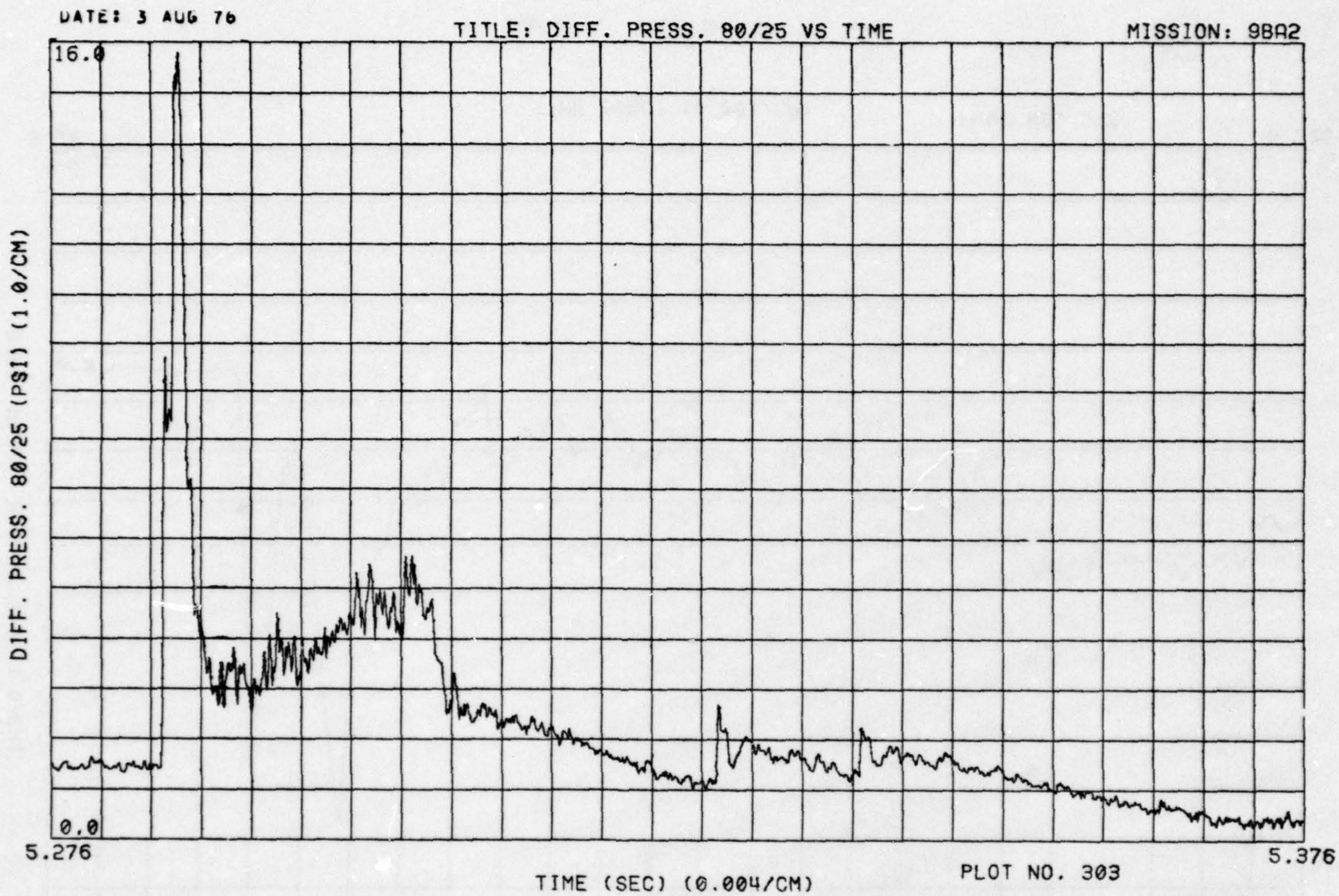


Figure 4. (Continued)

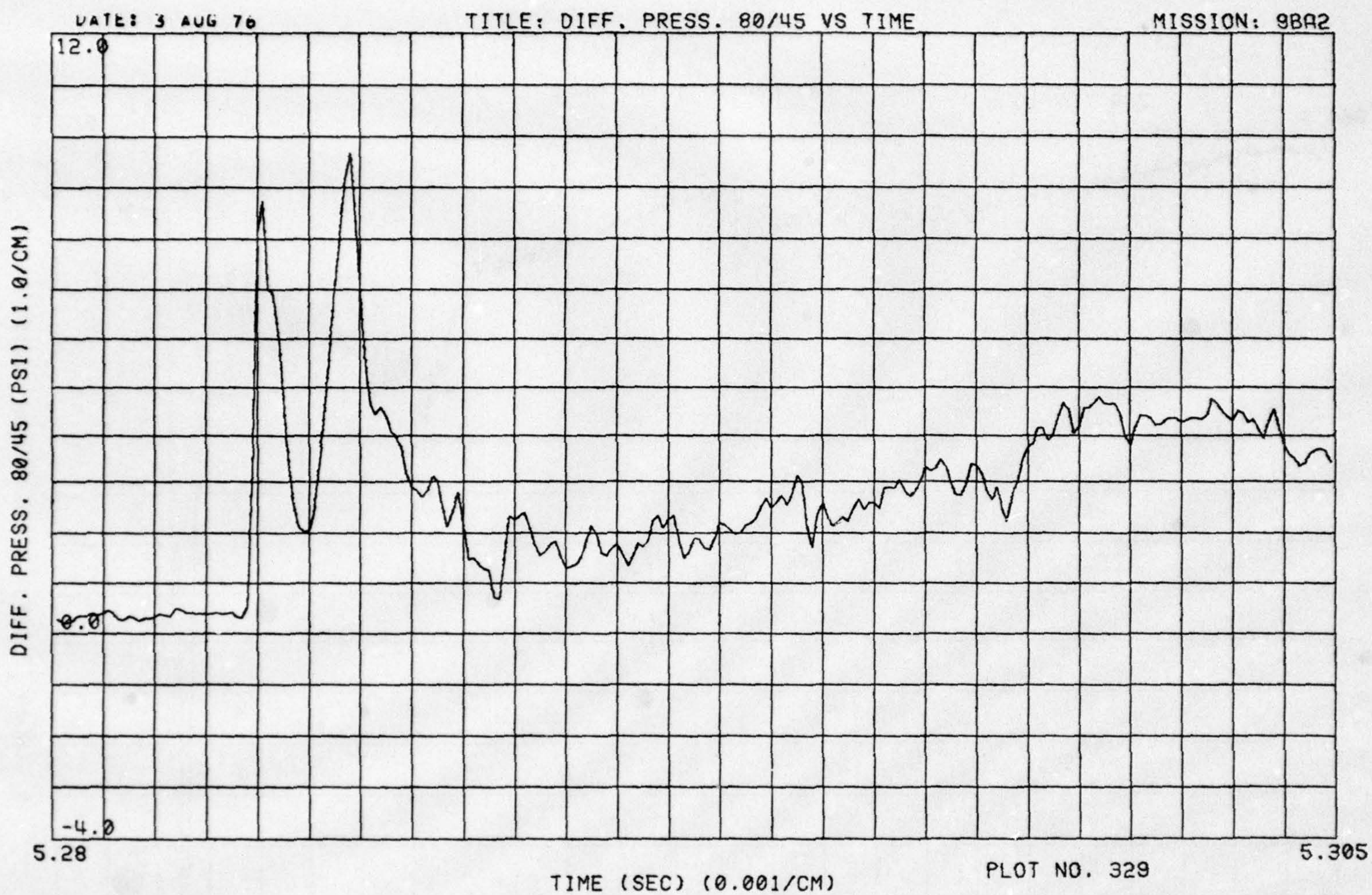


Figure 4. (Continued)

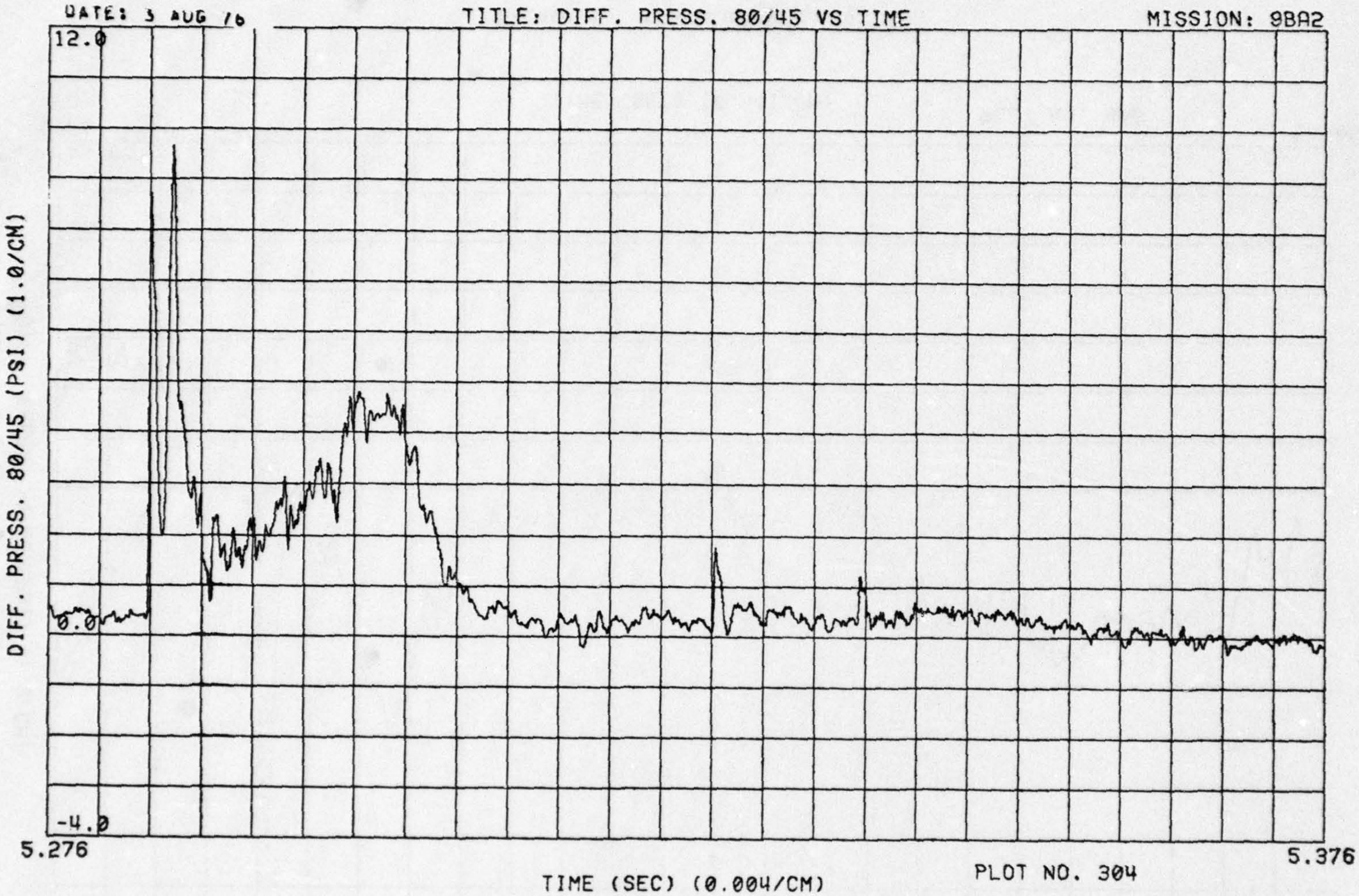


Figure 4. (Continued)

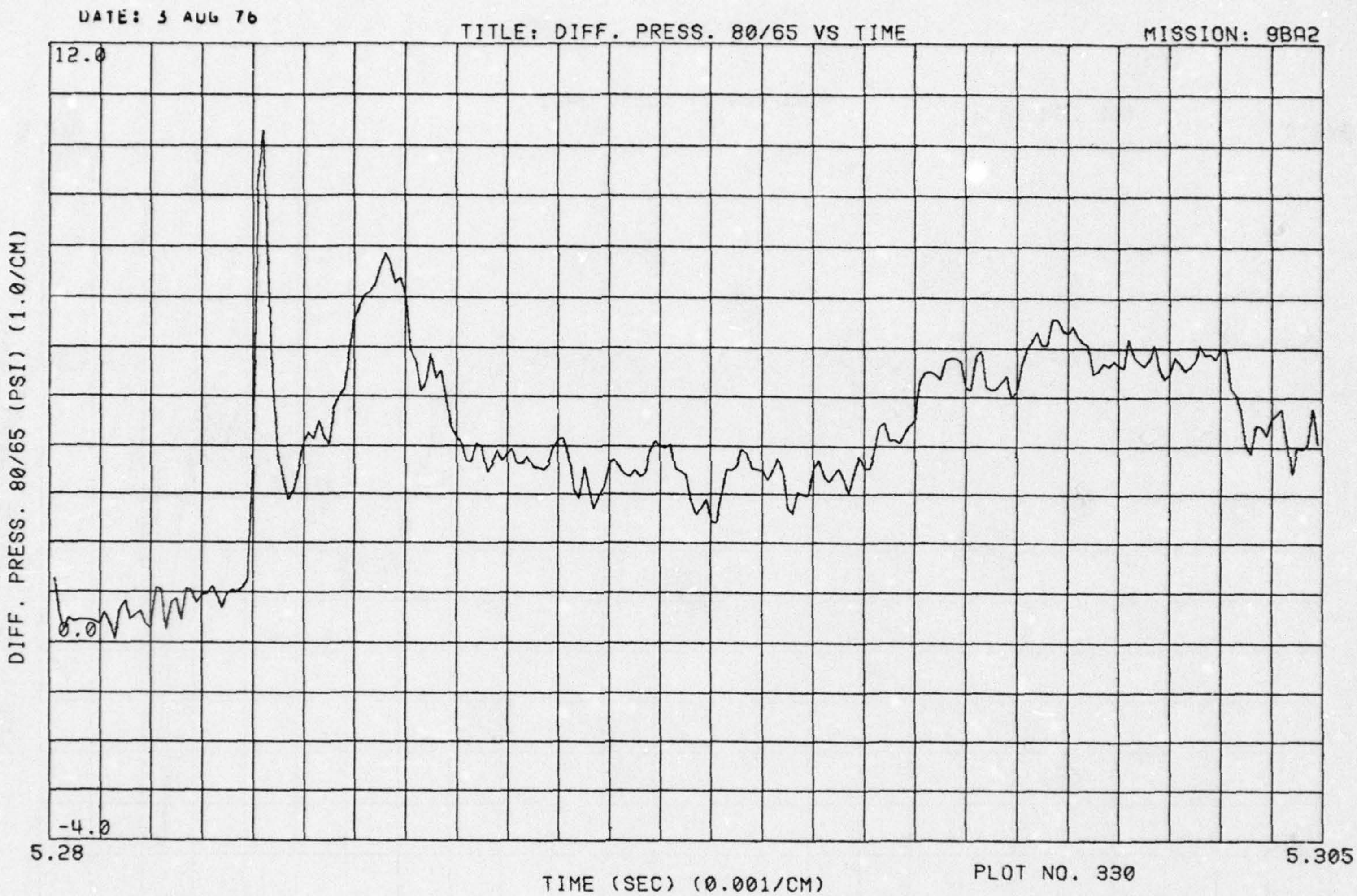


Figure 4. (Continued)

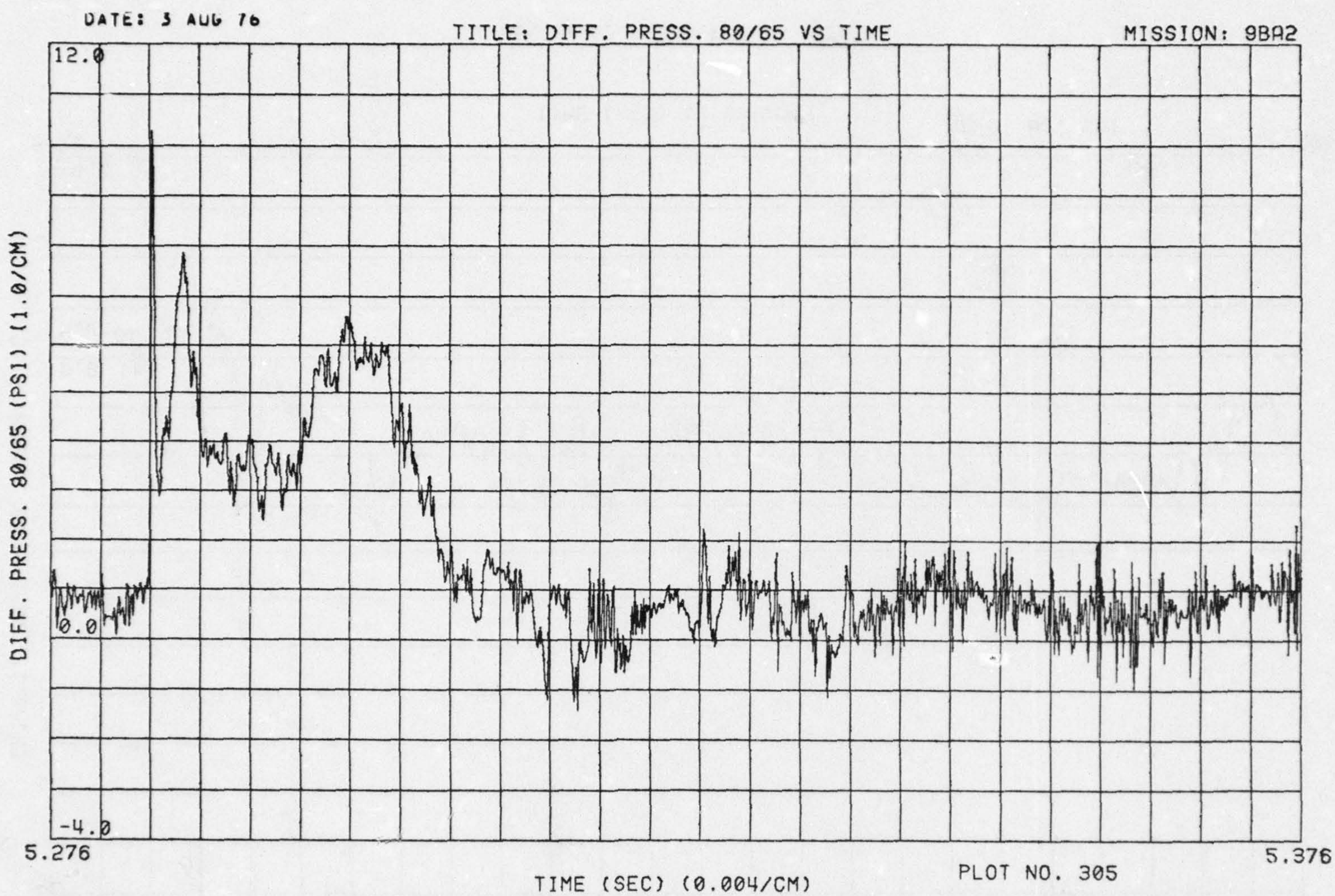


Figure 4. (Continued)

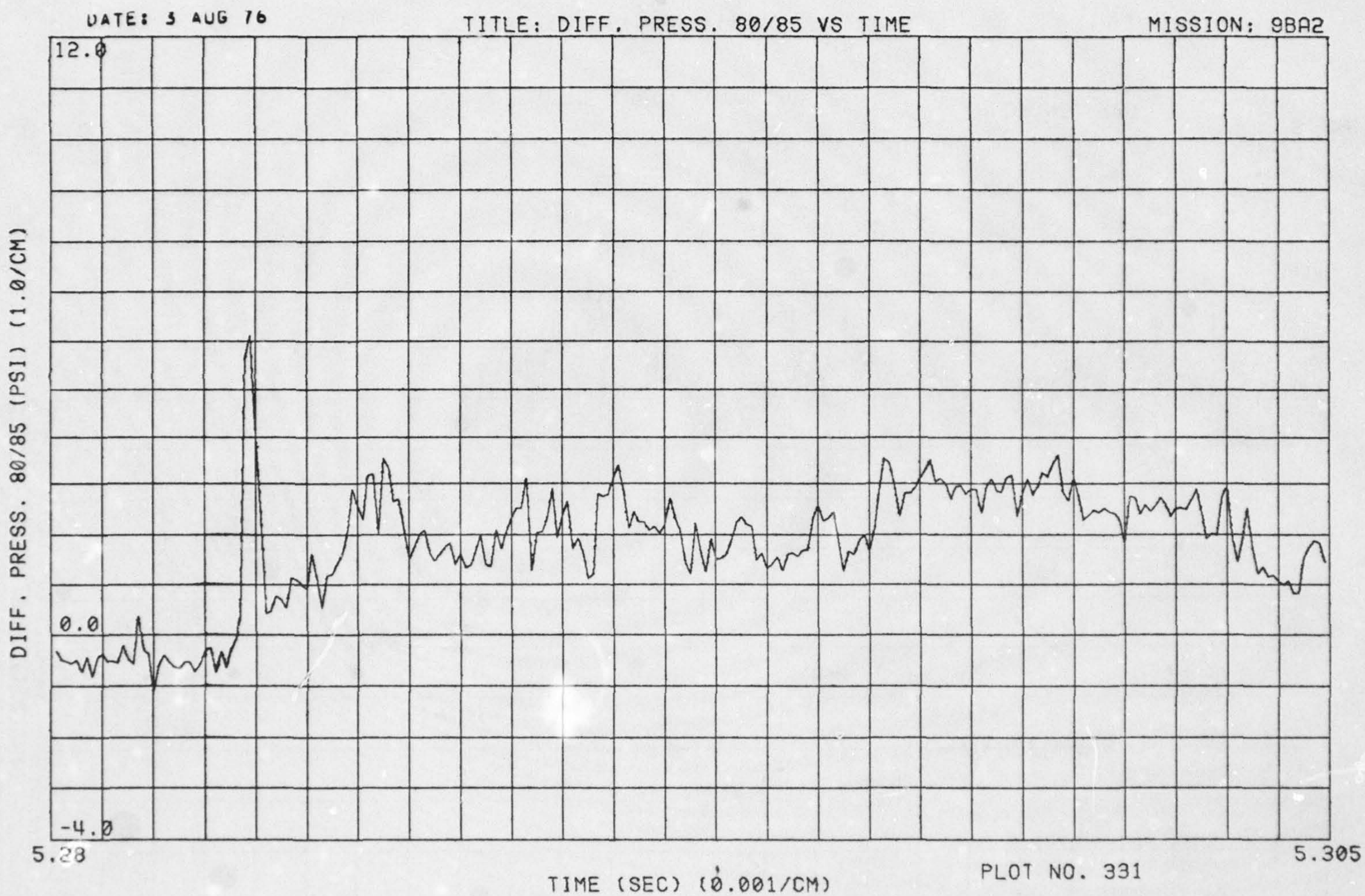


Figure 4. (Continued)

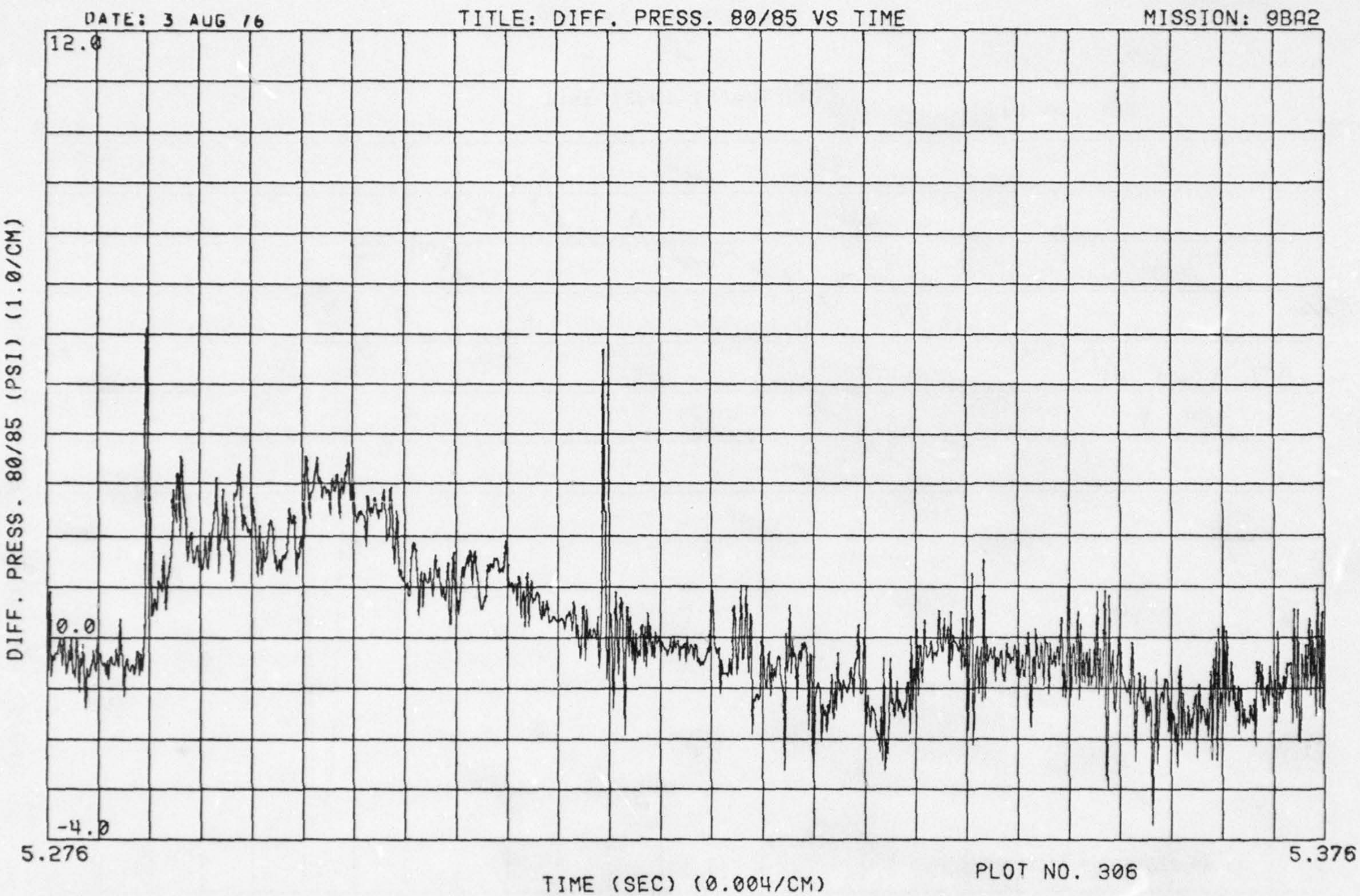


Figure 4. (Continued)

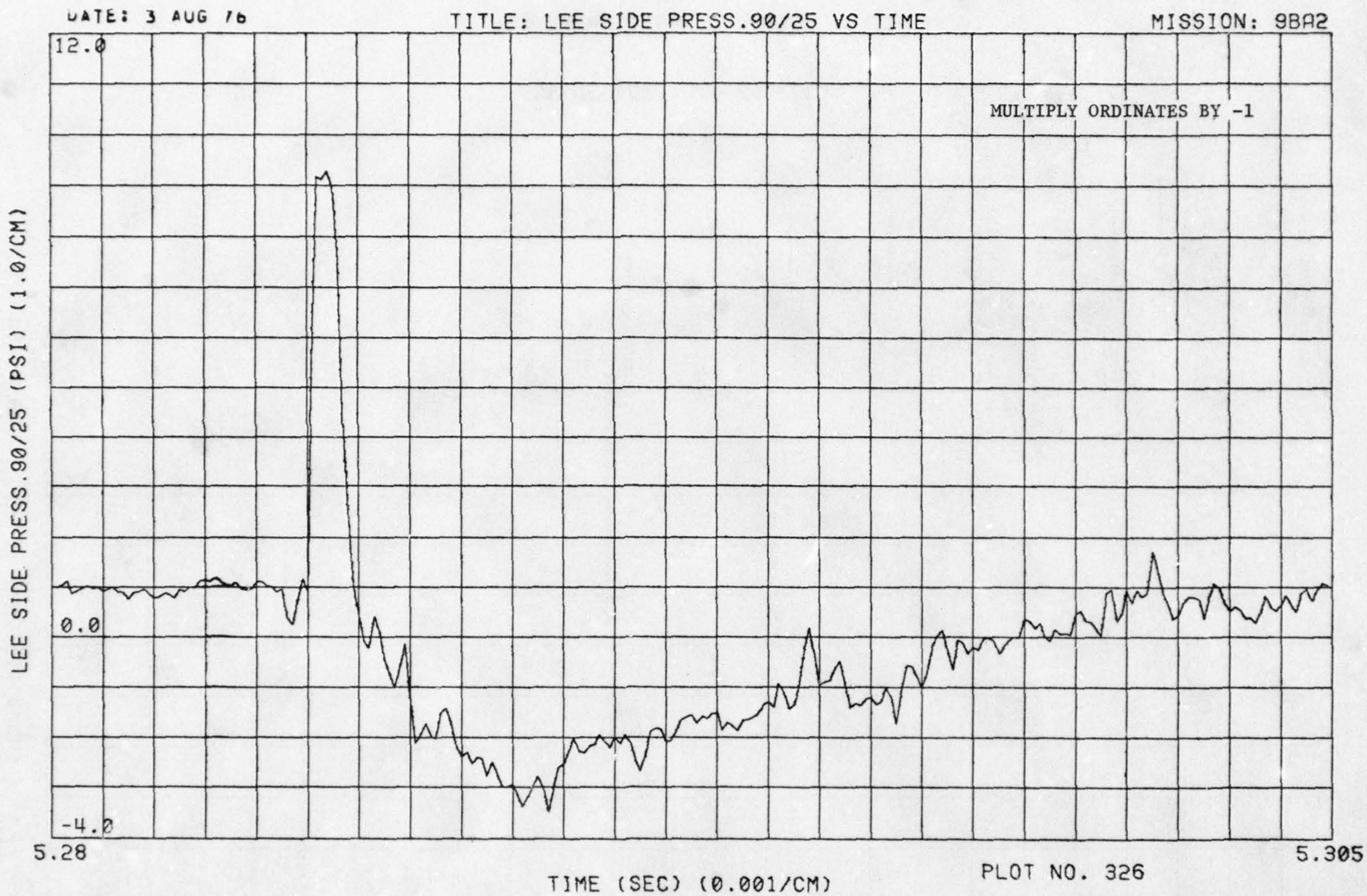


Figure 4. (Continued)

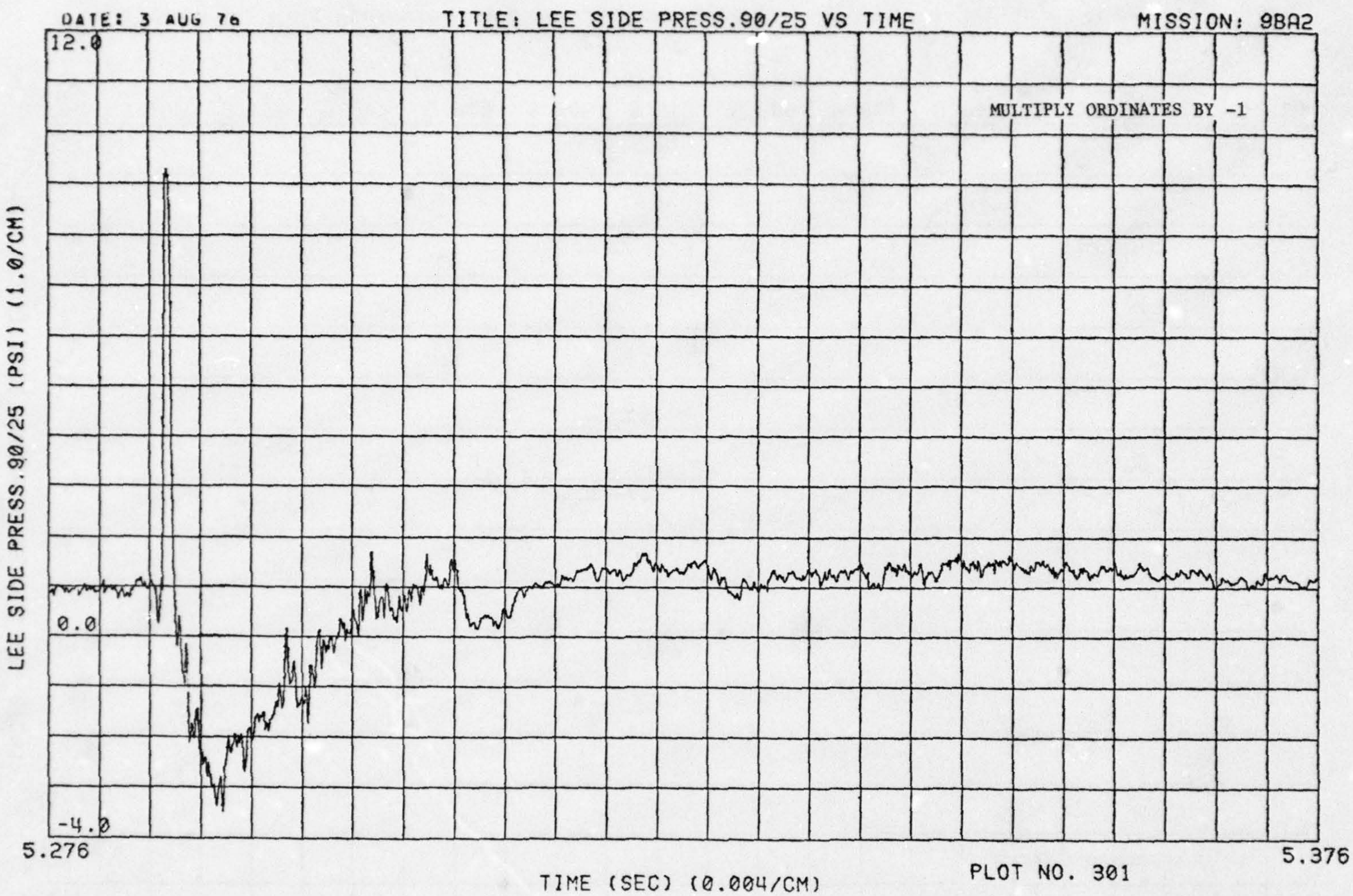


Figure 4. (Concluded)

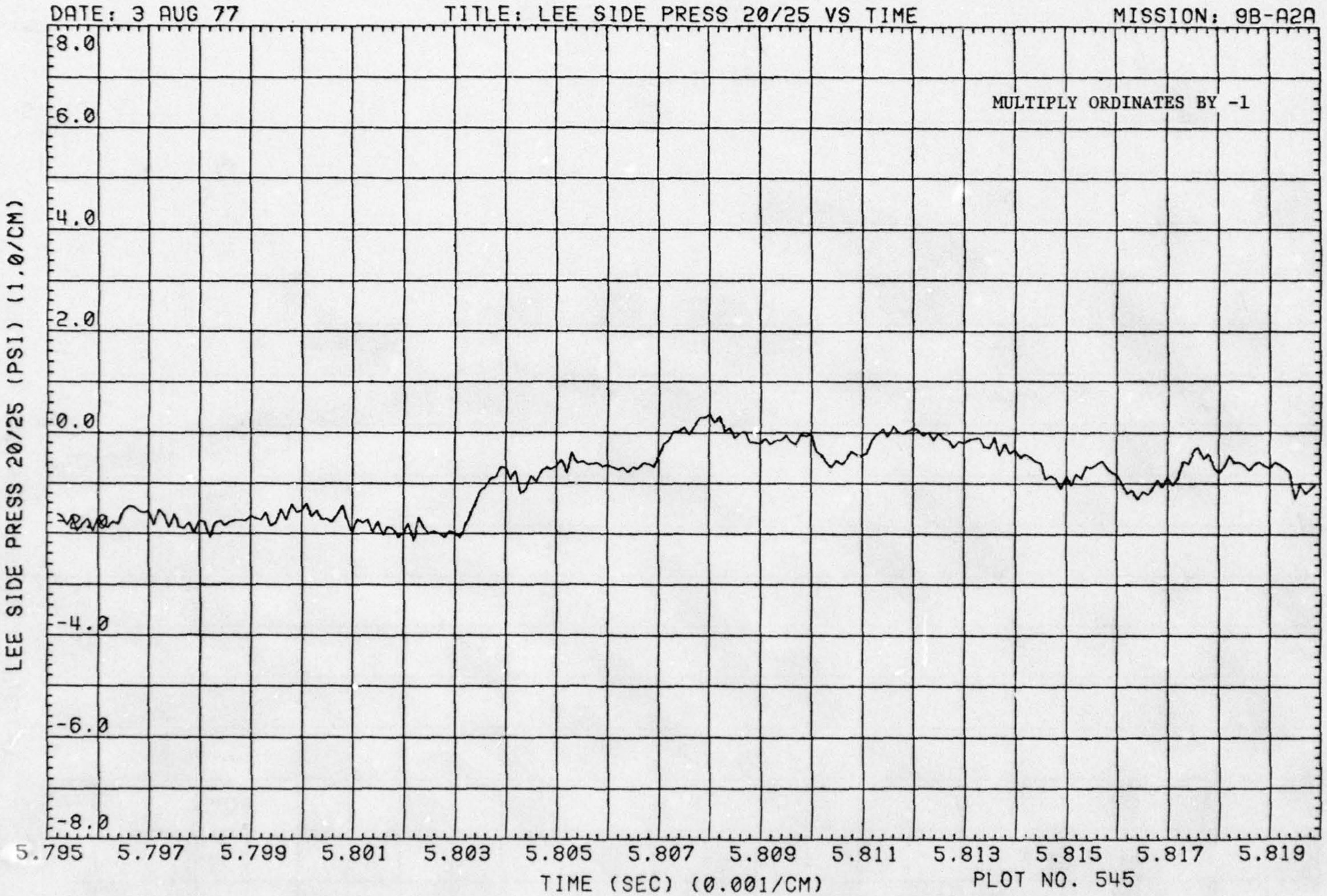


Figure 5. Wing Pressures, Run 9B-A2, Intercept 3, ϕ = 134.9 deg., Δp_s=2.0 psi.

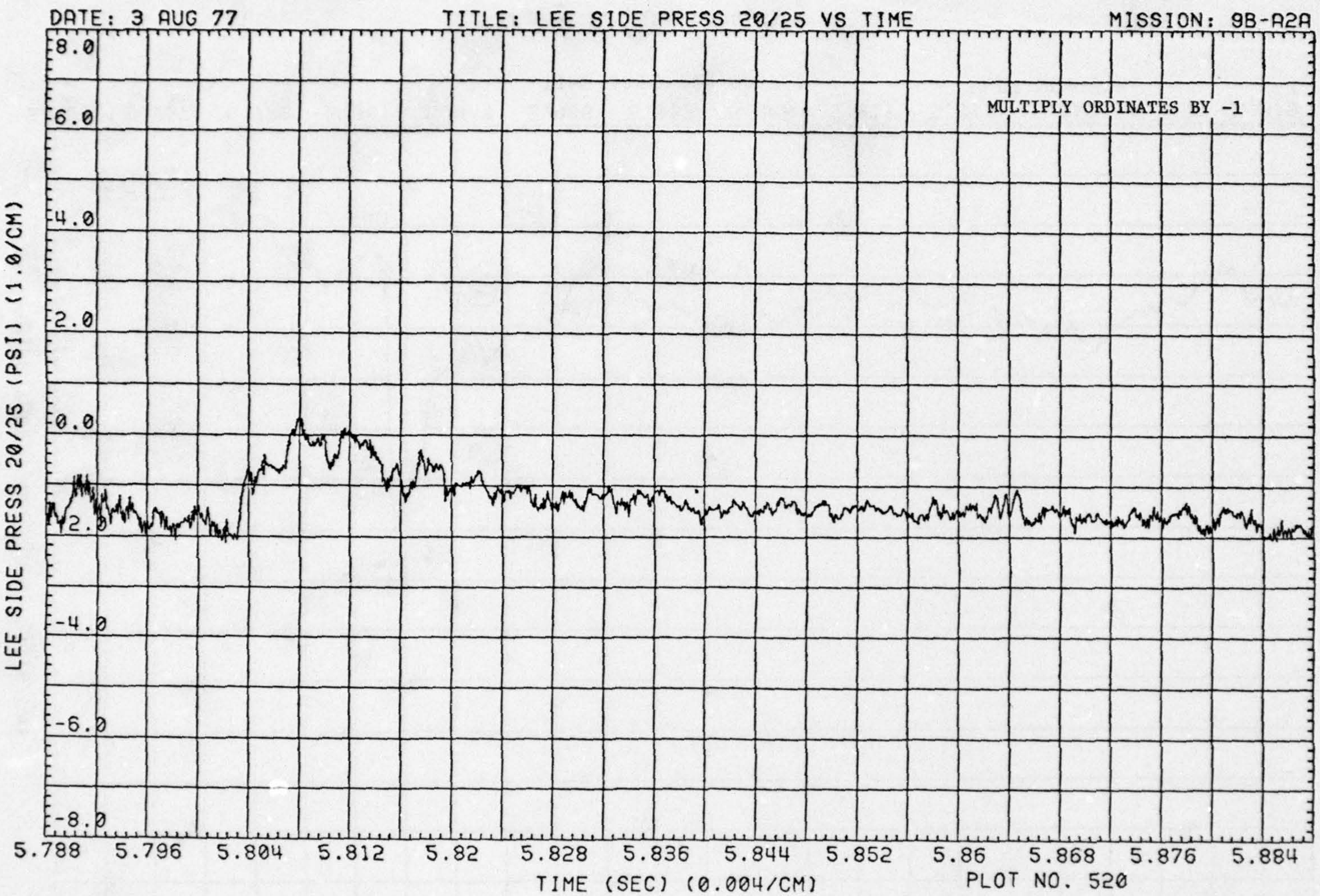


Figure 5. (Continued)

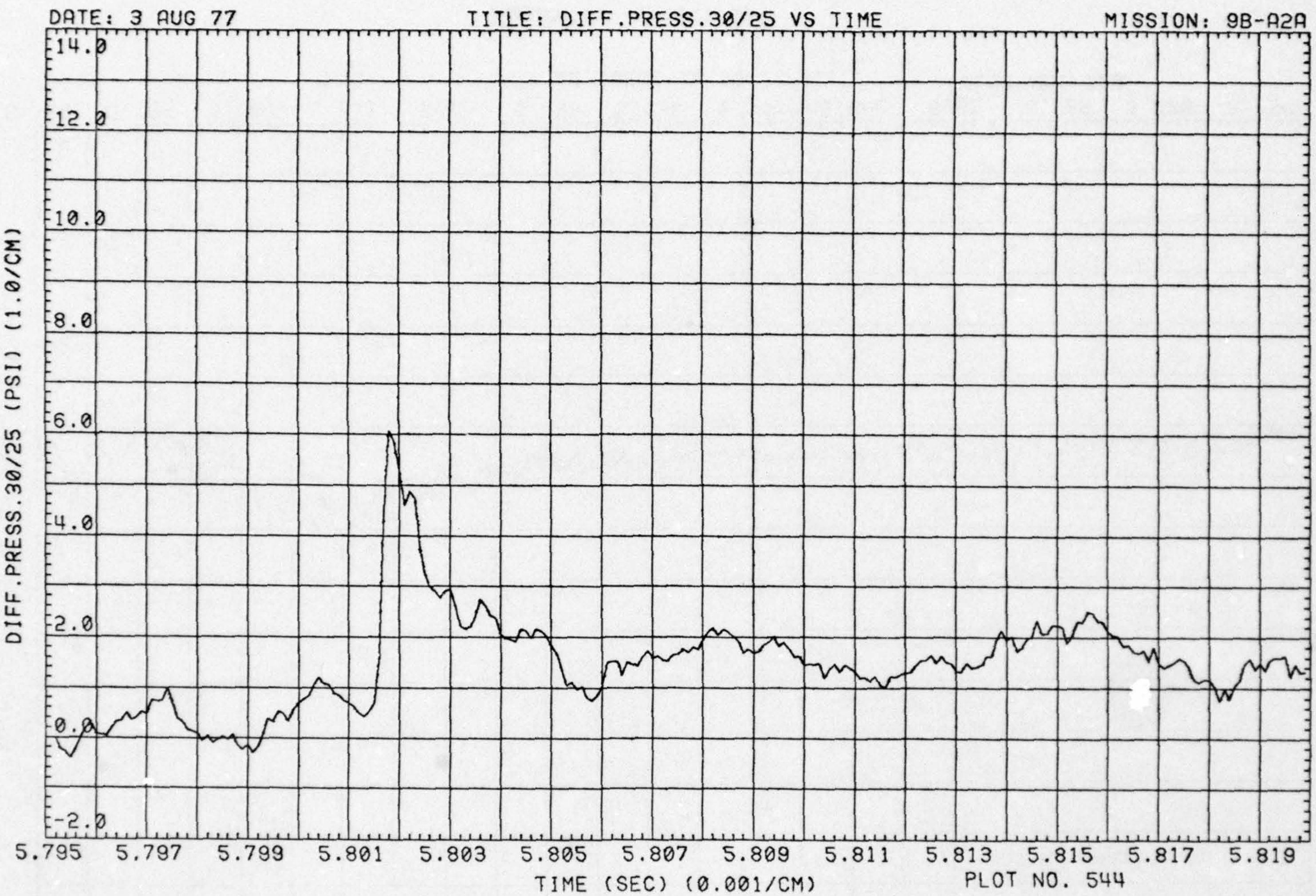


Figure 5. (Continued)

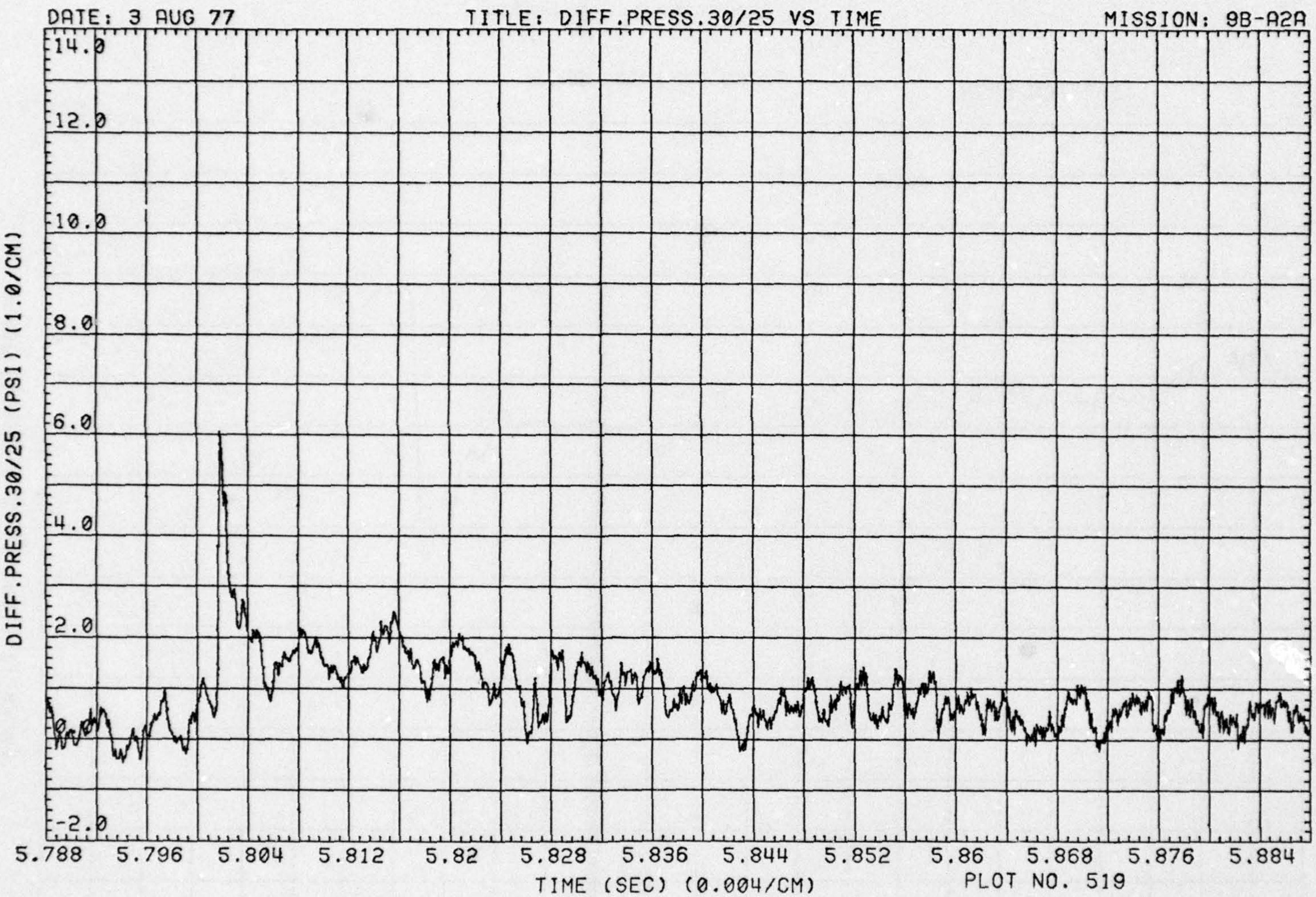


Figure 5. (Continued)

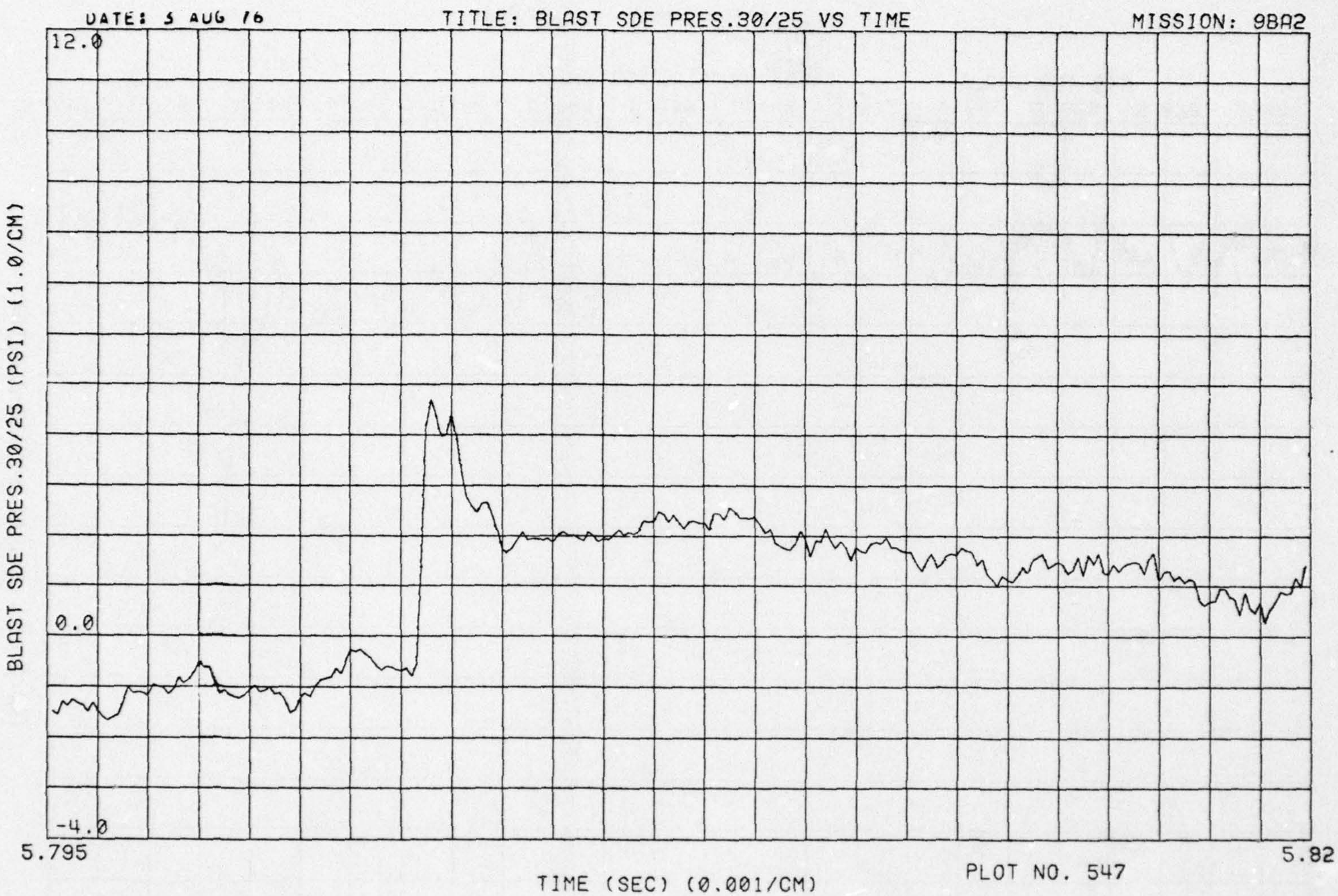


Figure 5. (Continued)

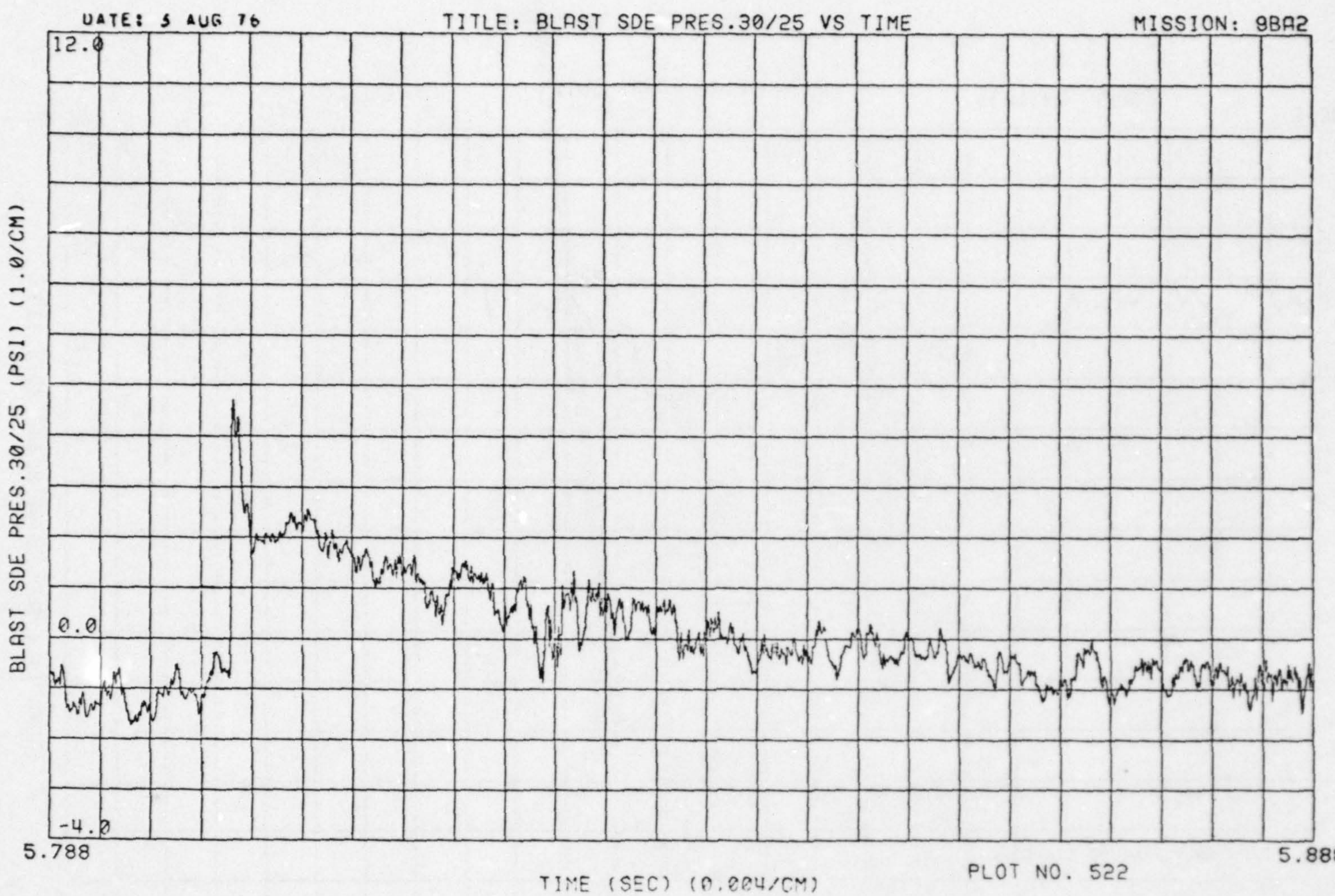


Figure 5. (Continued)

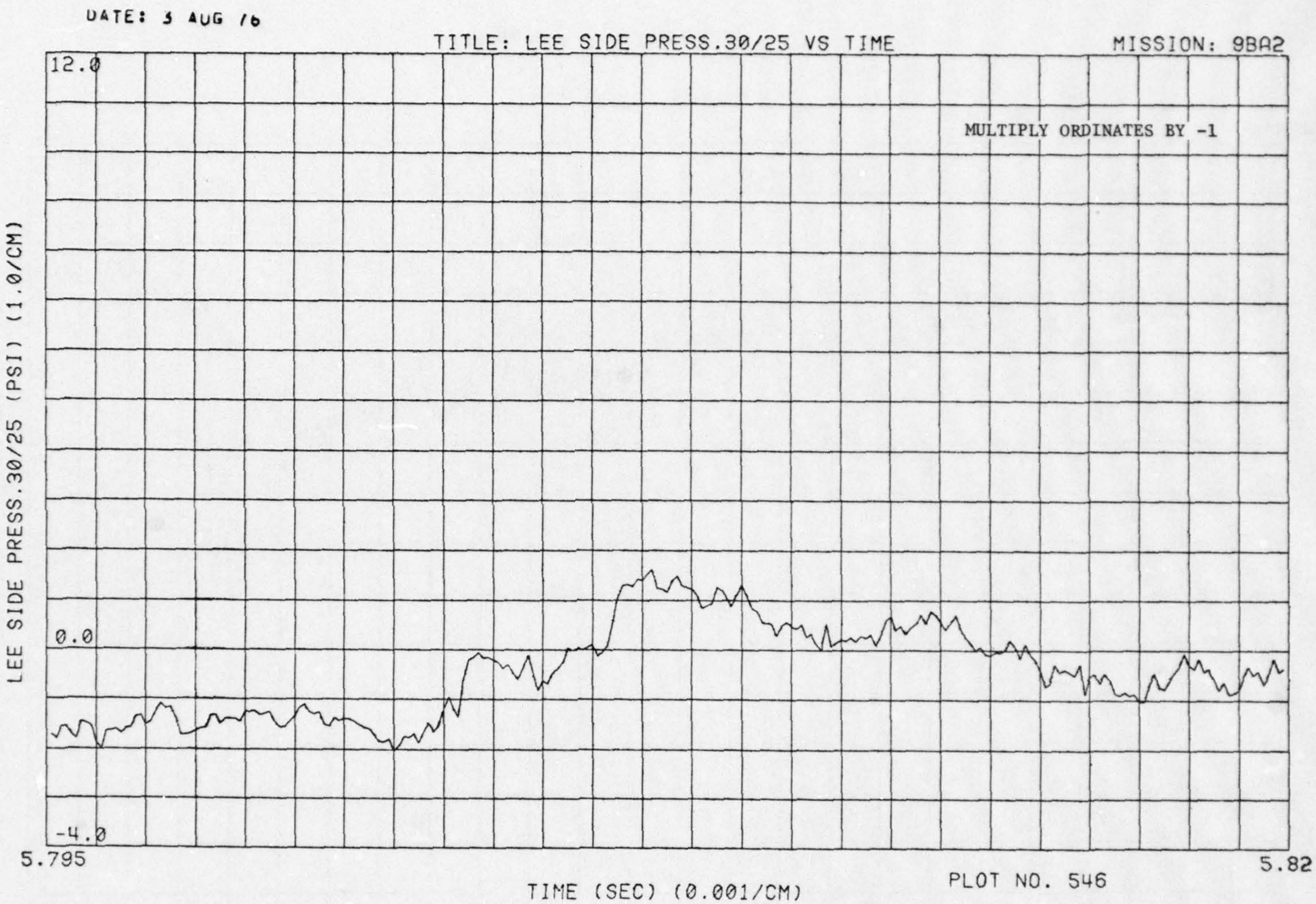


Figure 5. (Continued)

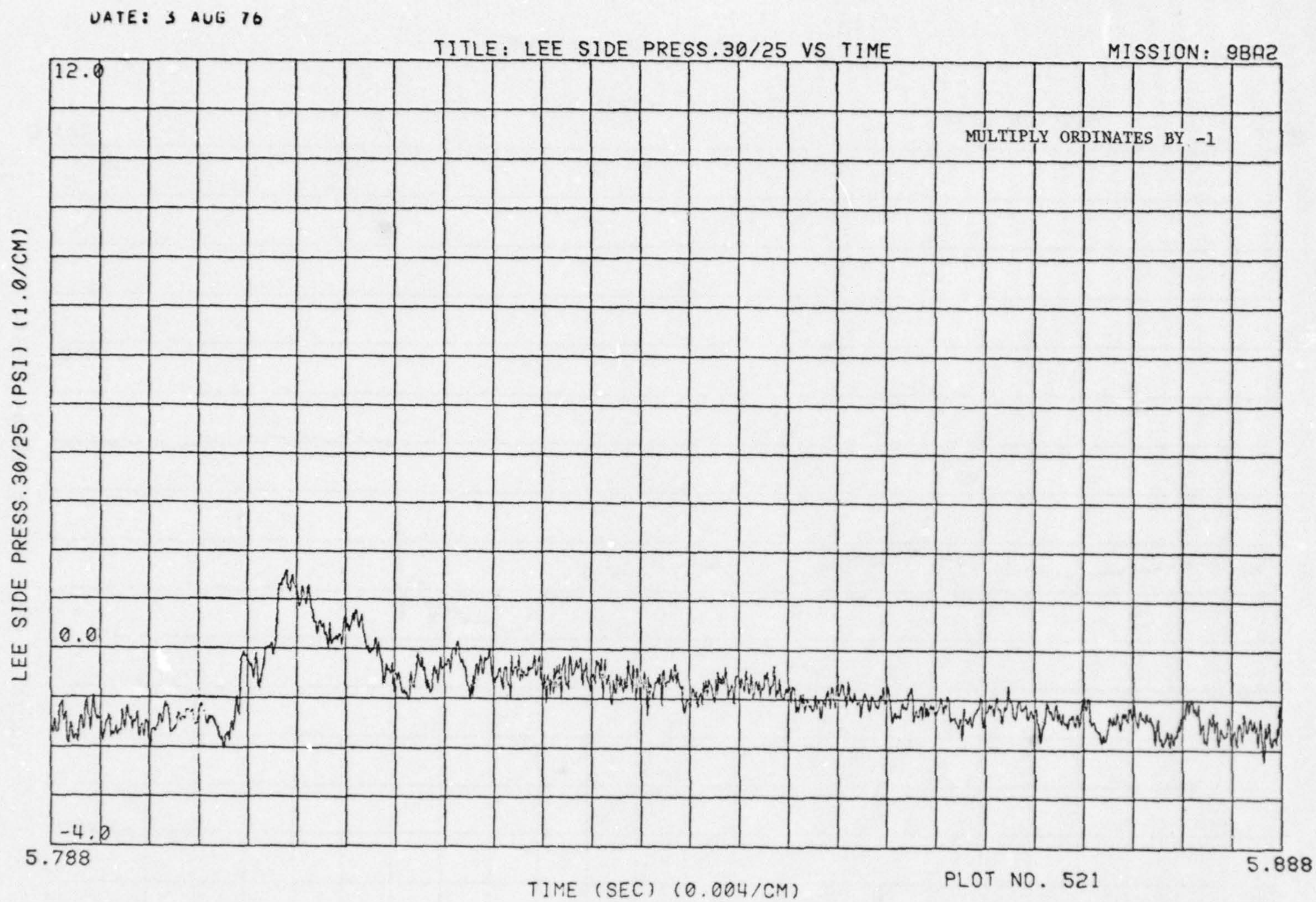


Figure 5. (Continued)

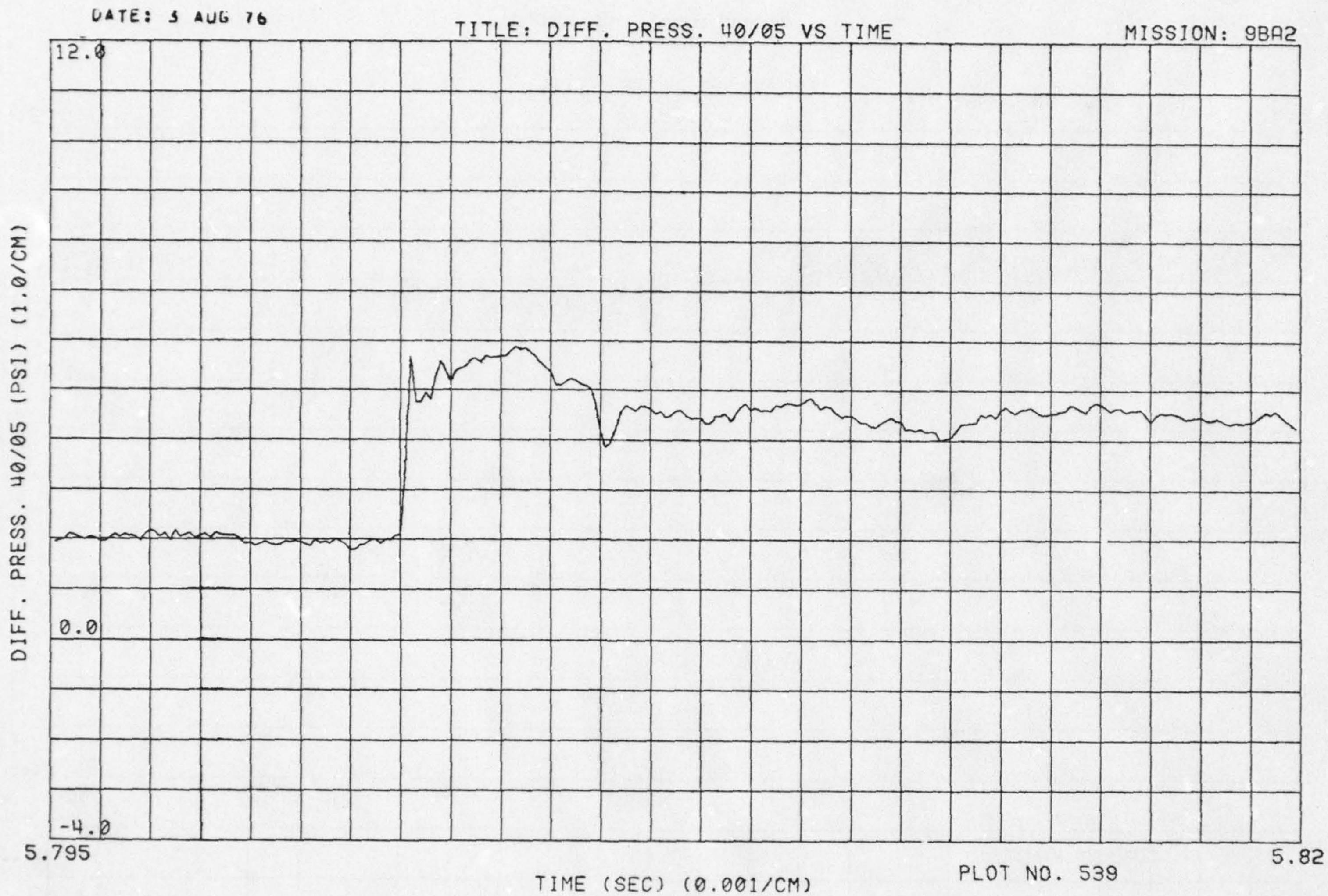


Figure 5. (Continued)

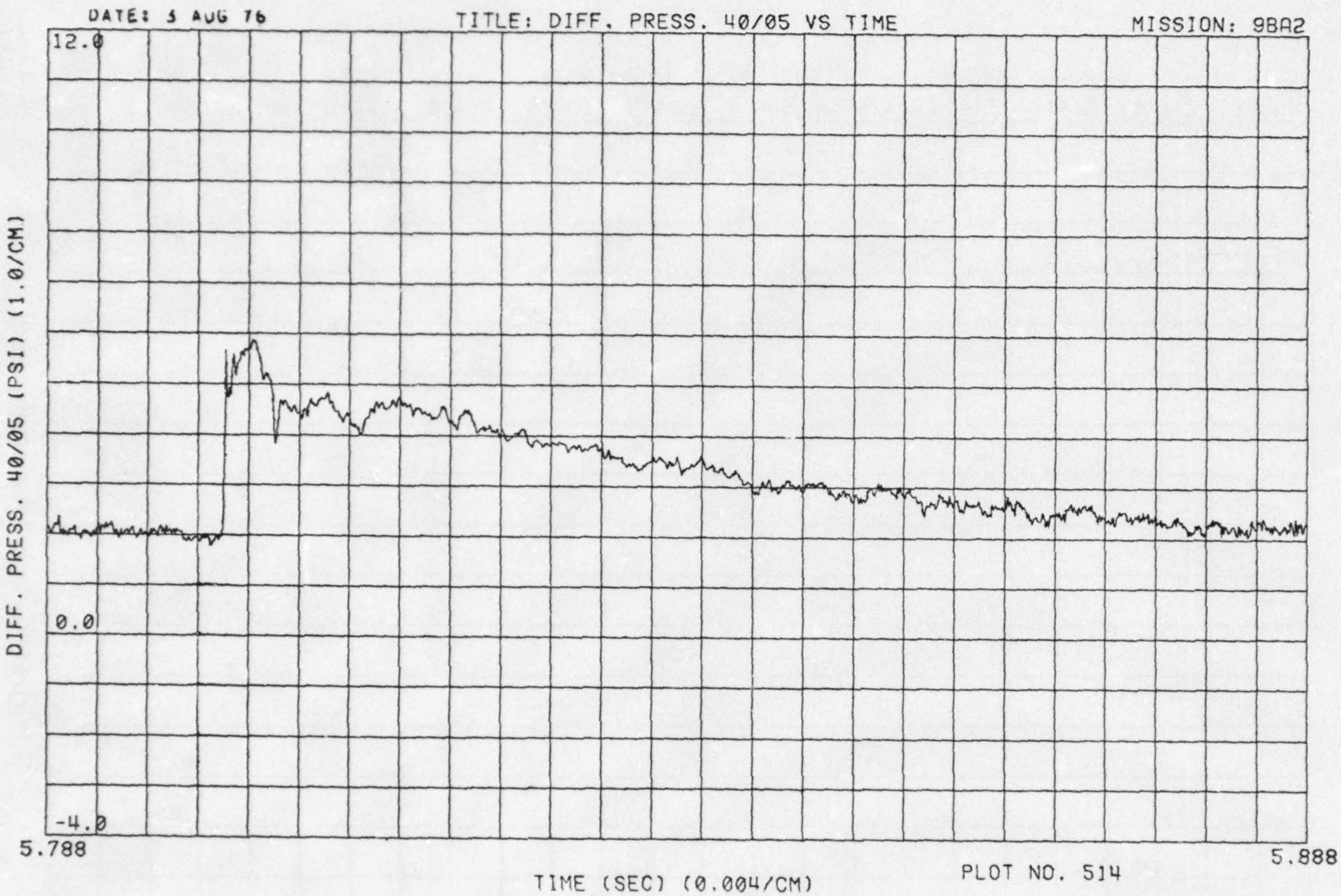


Figure 5. (Continued)

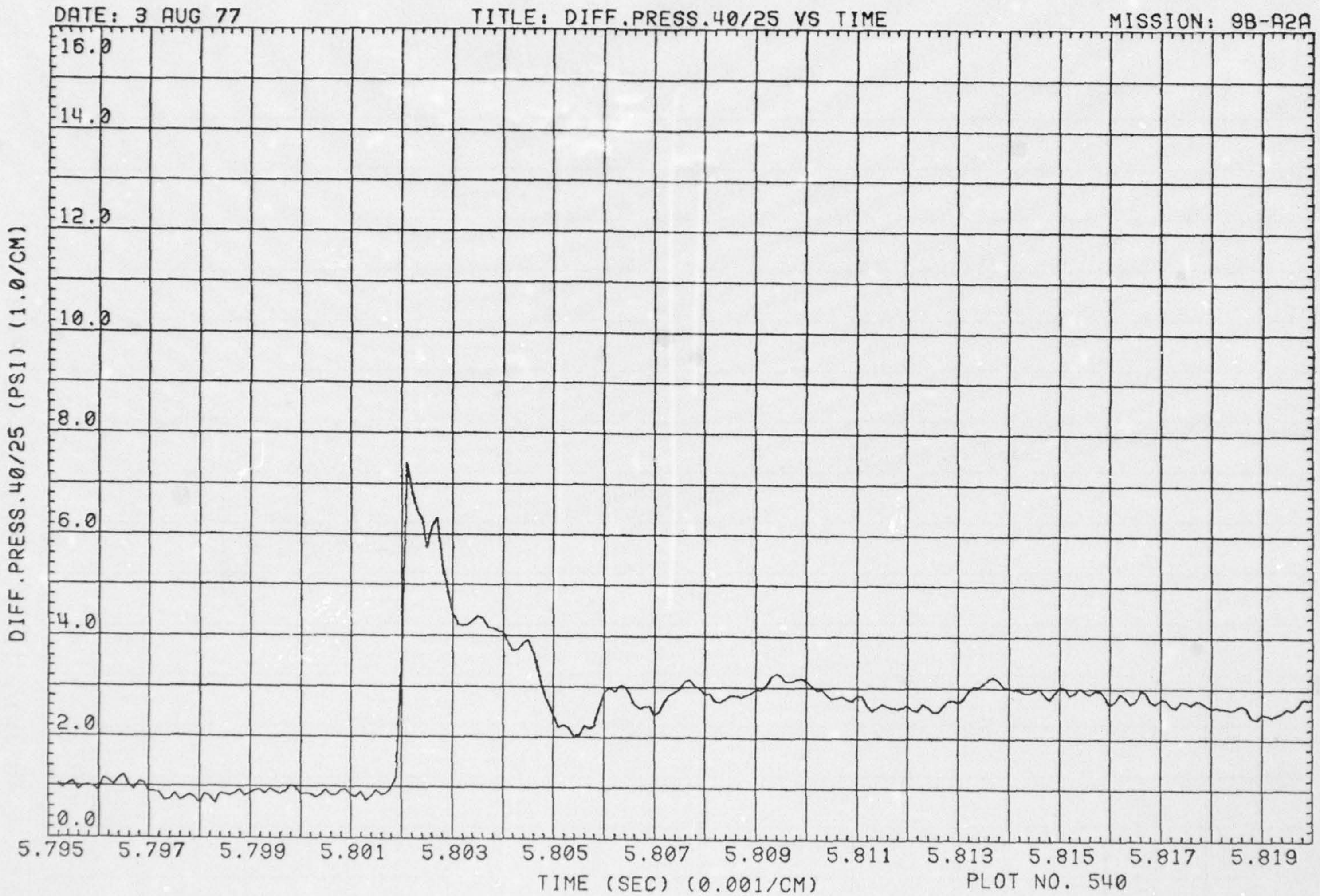


Figure 5. (Continued)

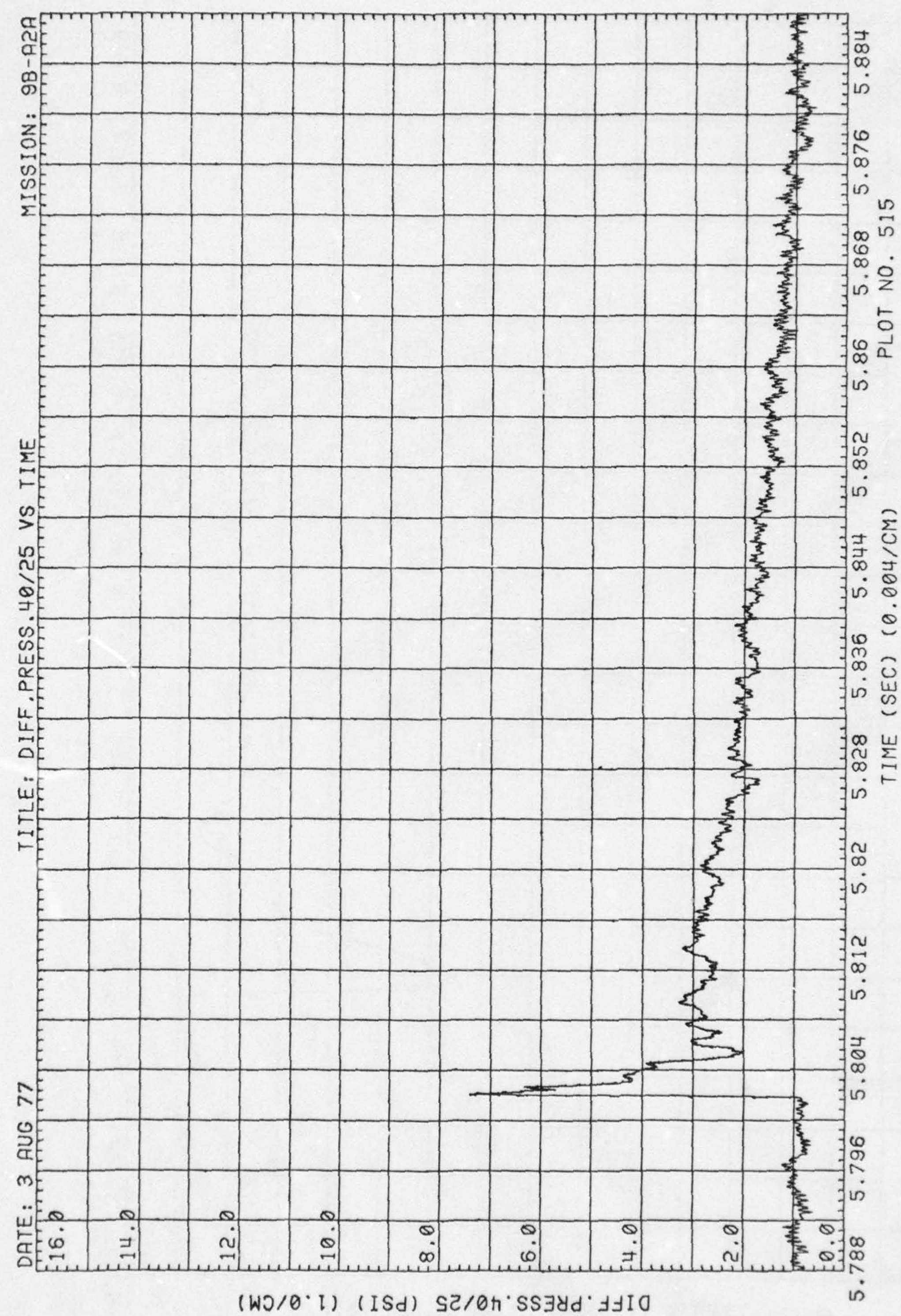


Figure 5. (Continued)

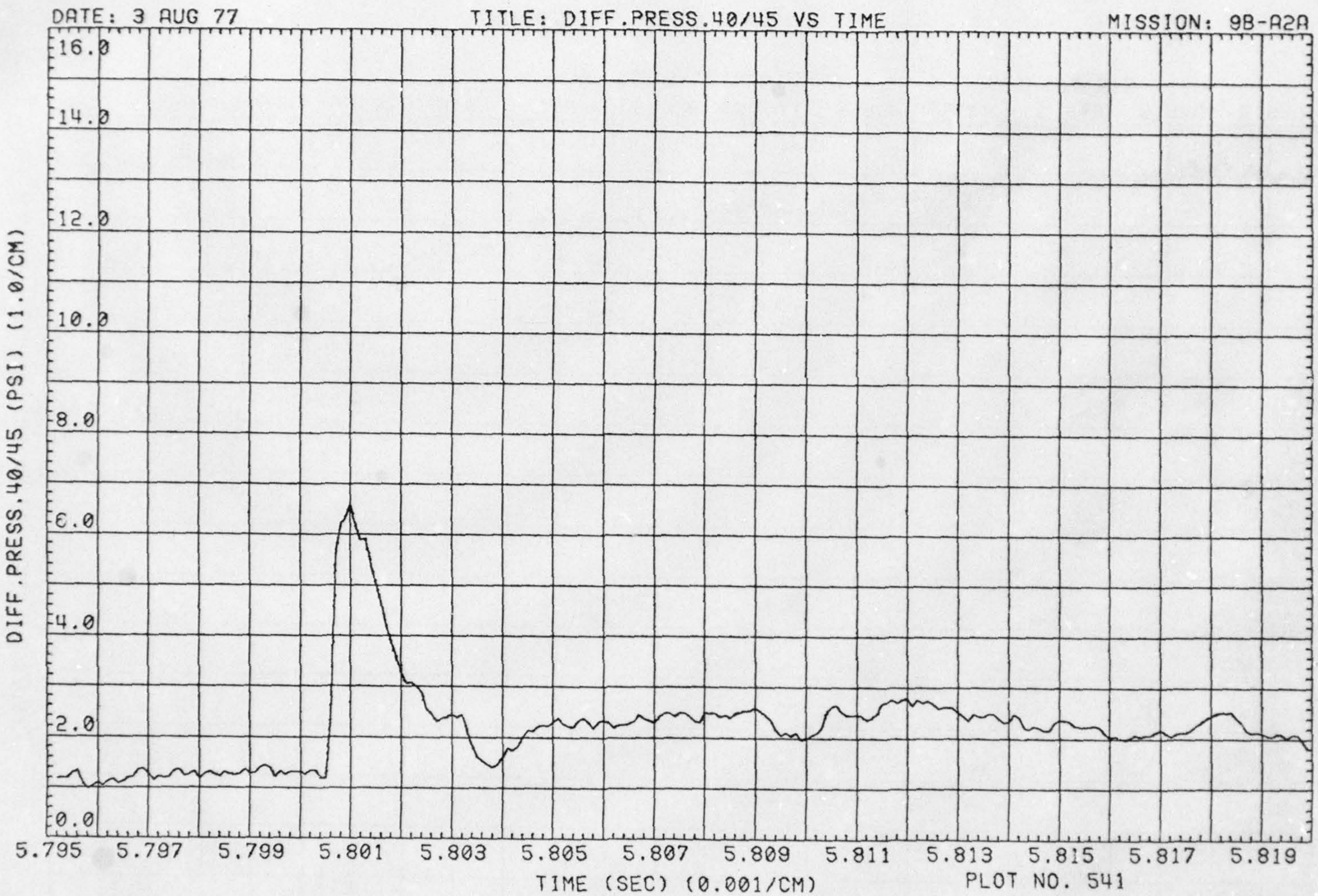


Figure 5. (Continued)

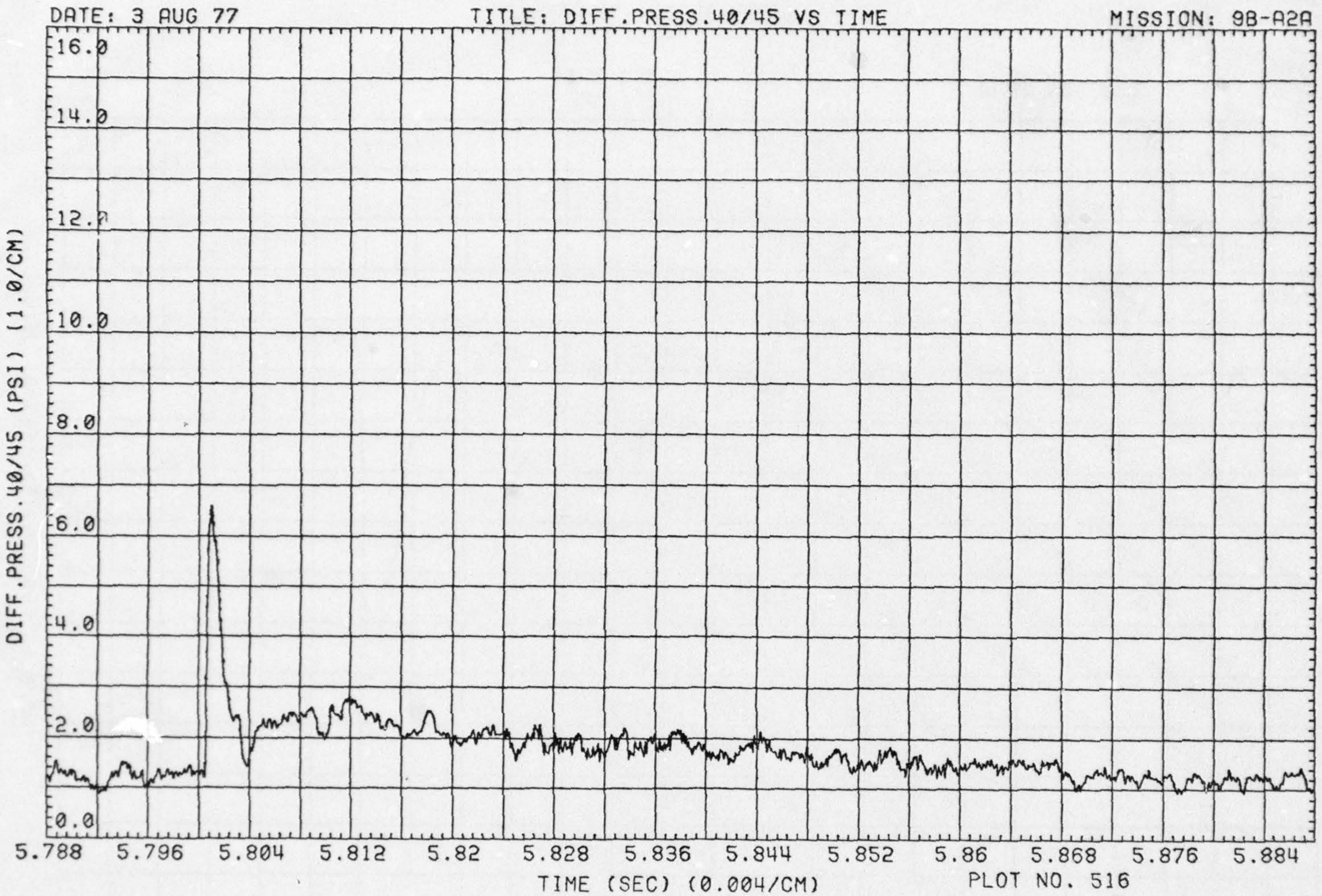


Figure 5. (Continued)

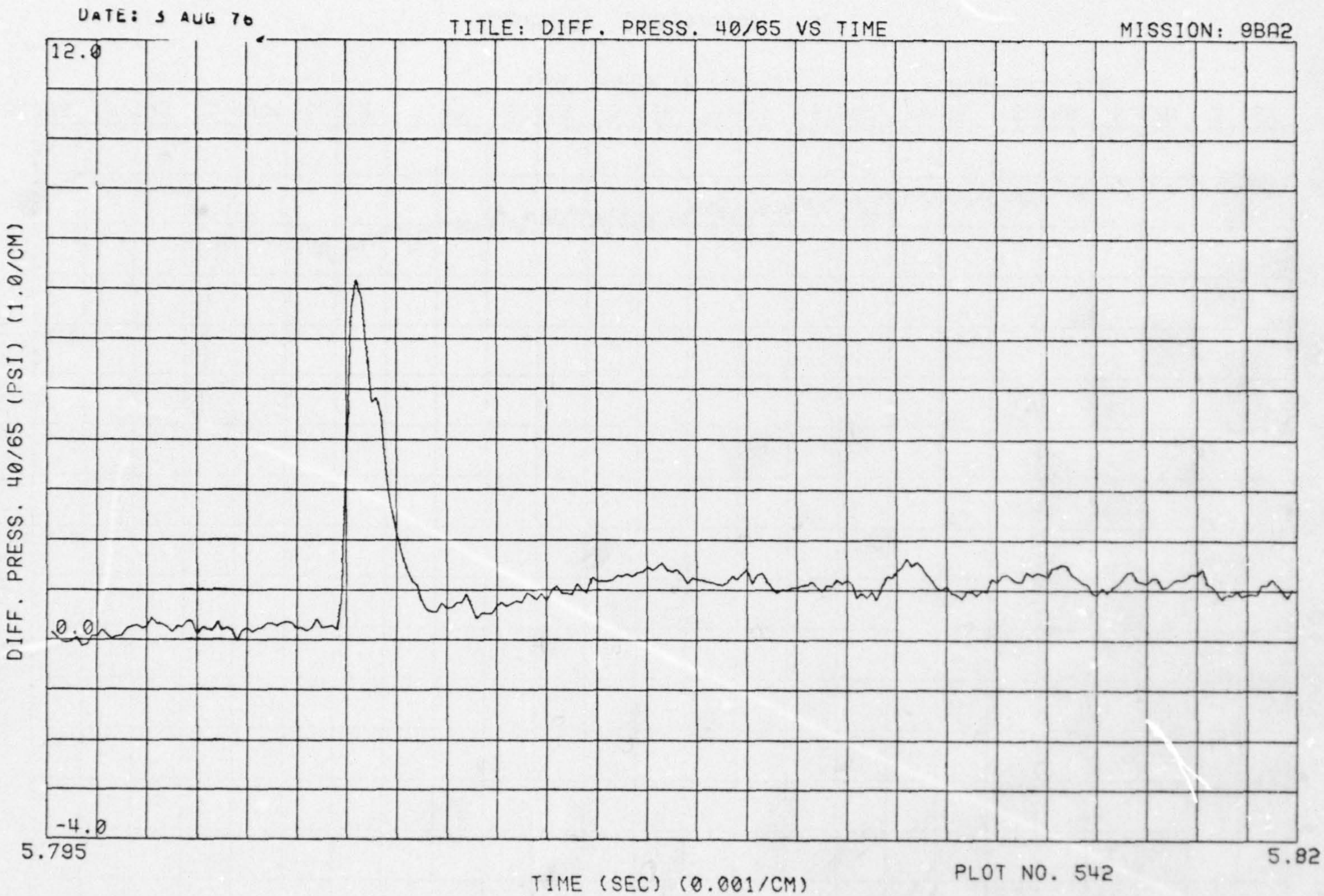


Figure 5. (Continued)

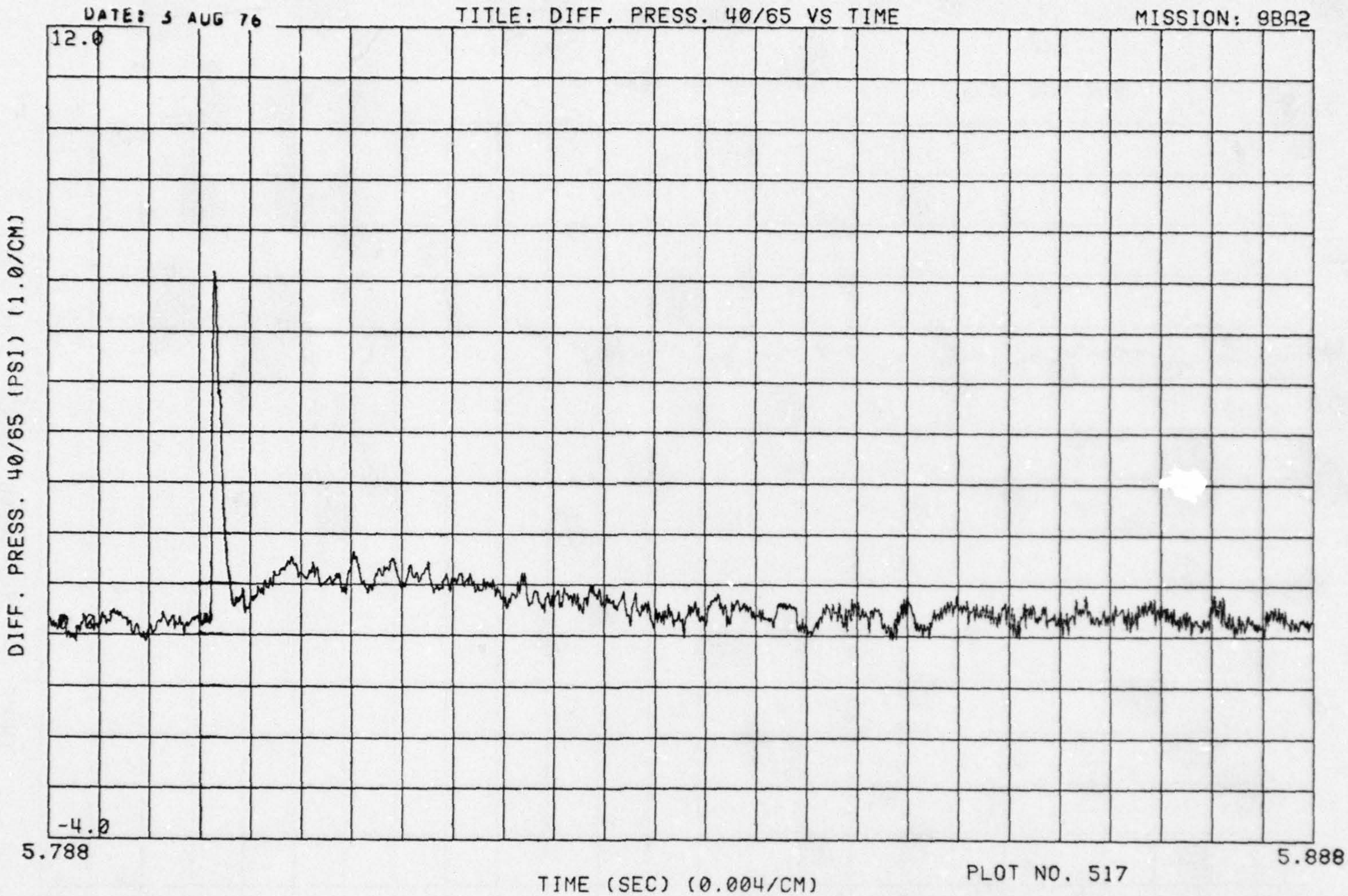


Figure 5. (Continued)

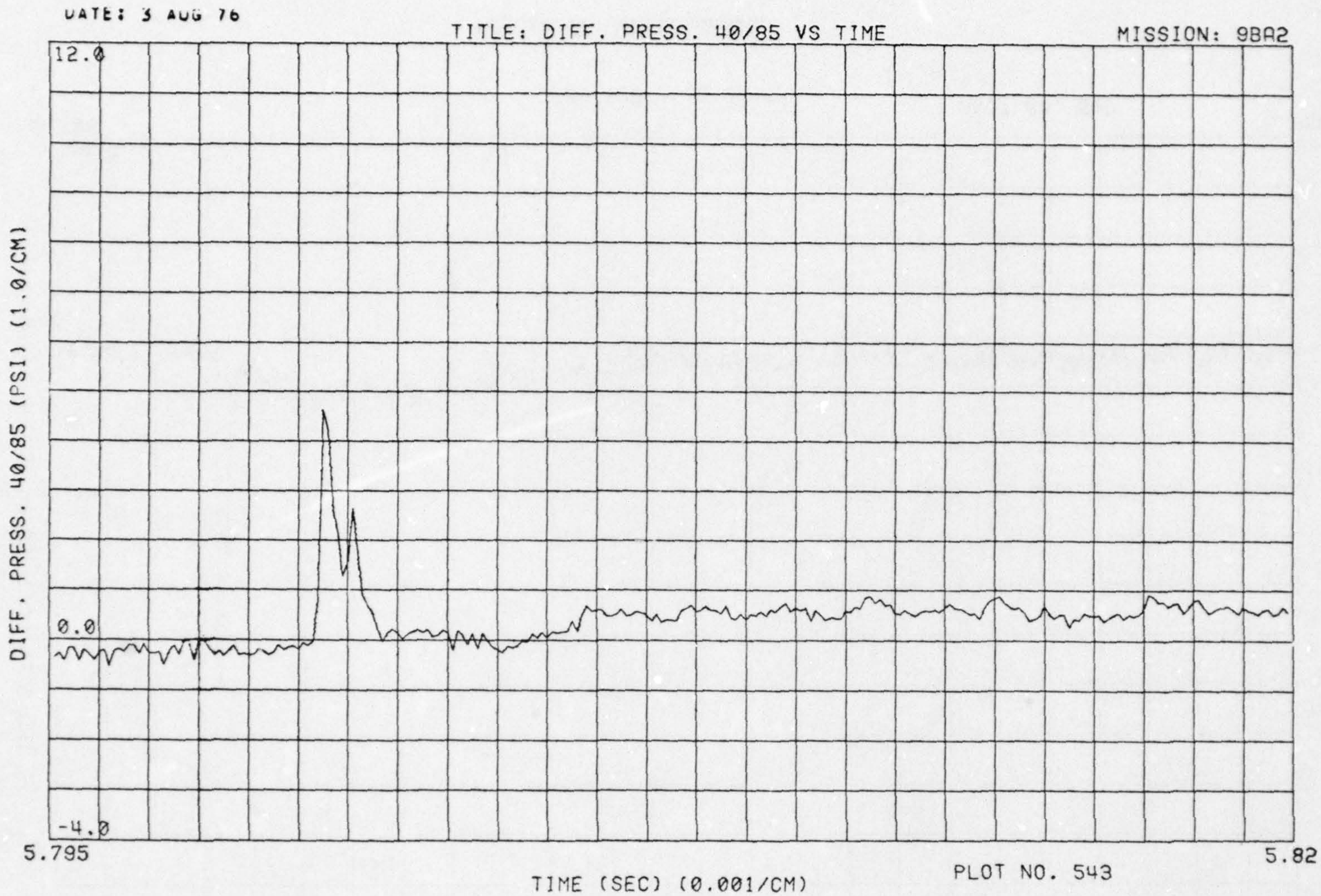


Figure 5. (Continued)

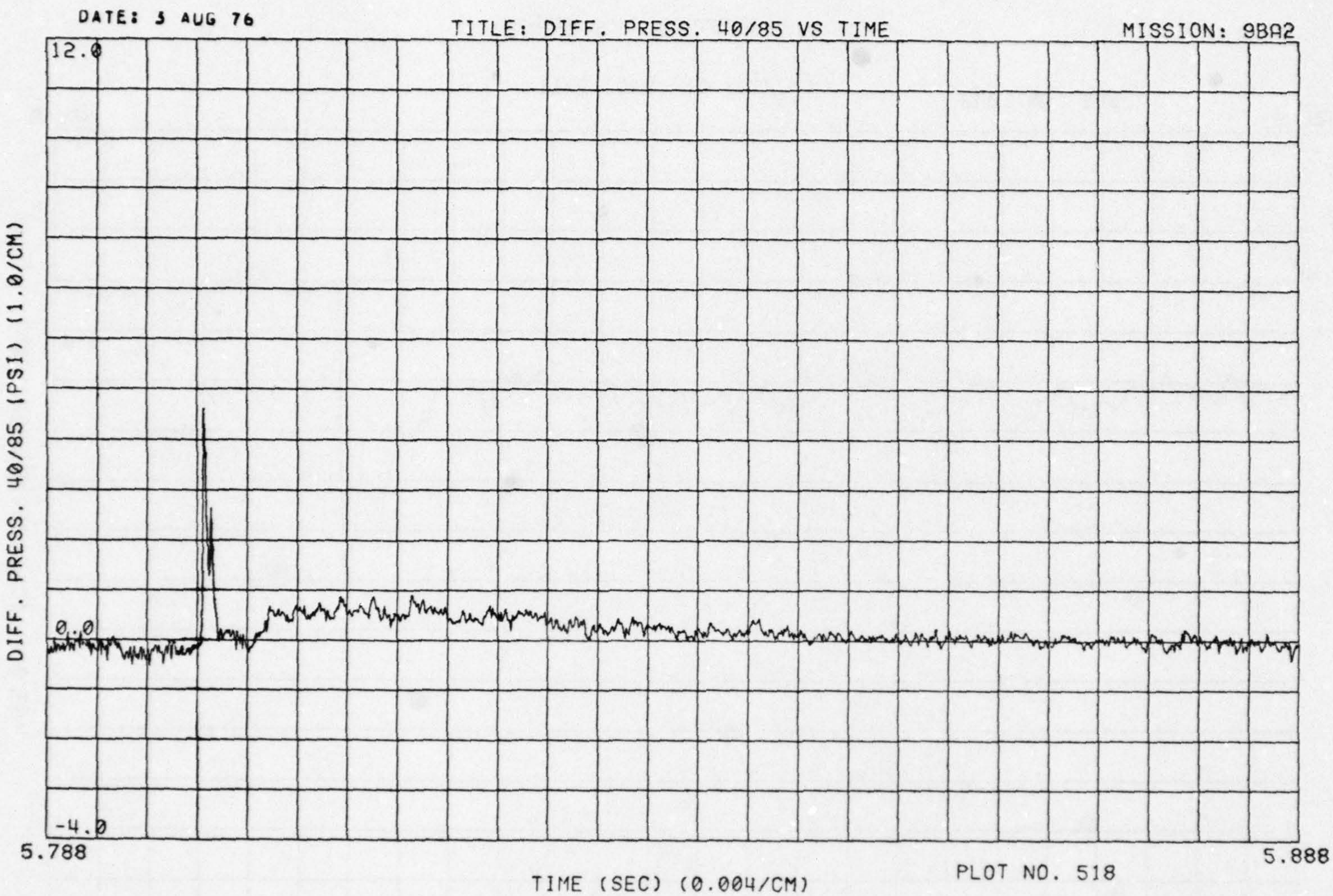


Figure 5. (Continued)

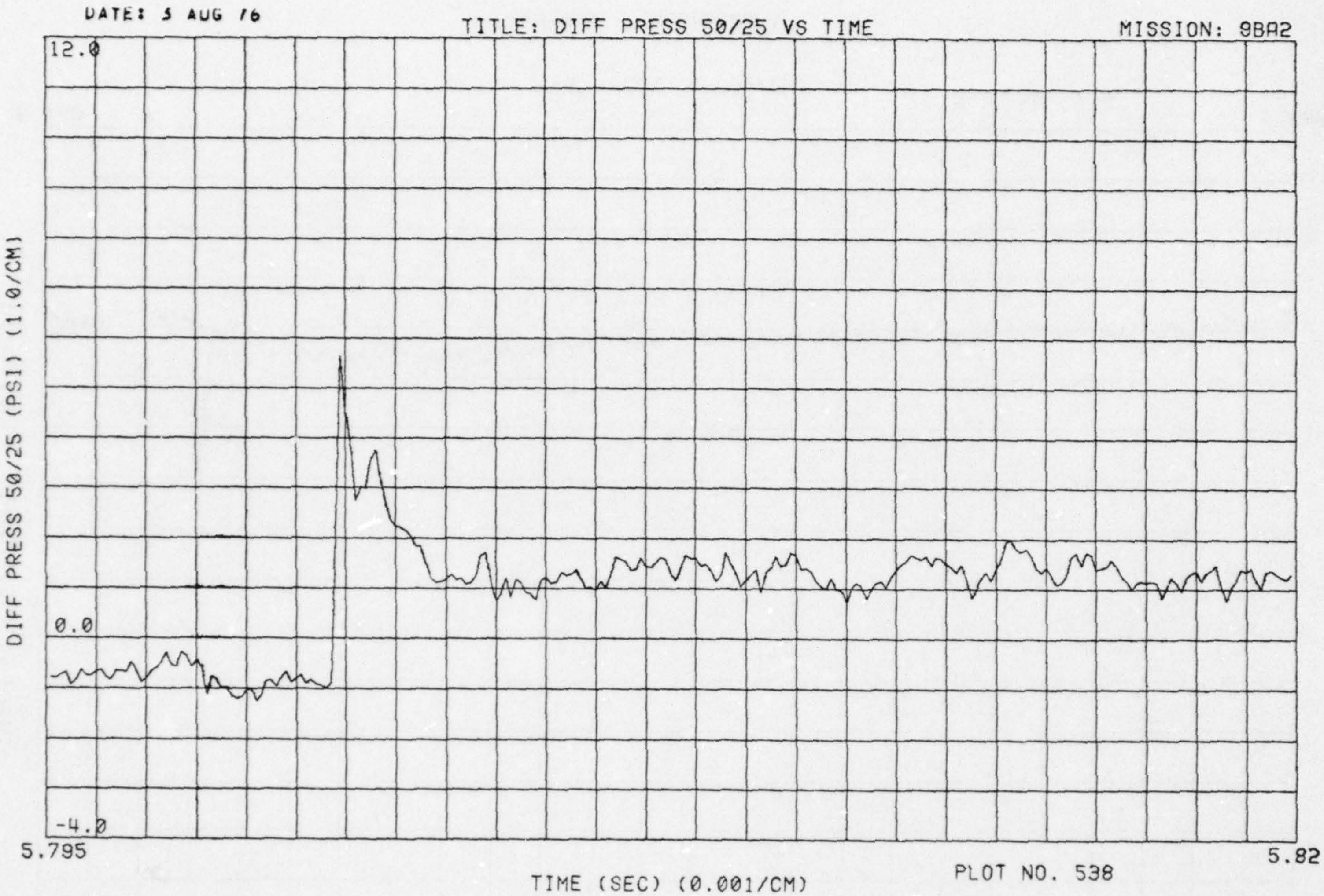


Figure 5. (Continued)

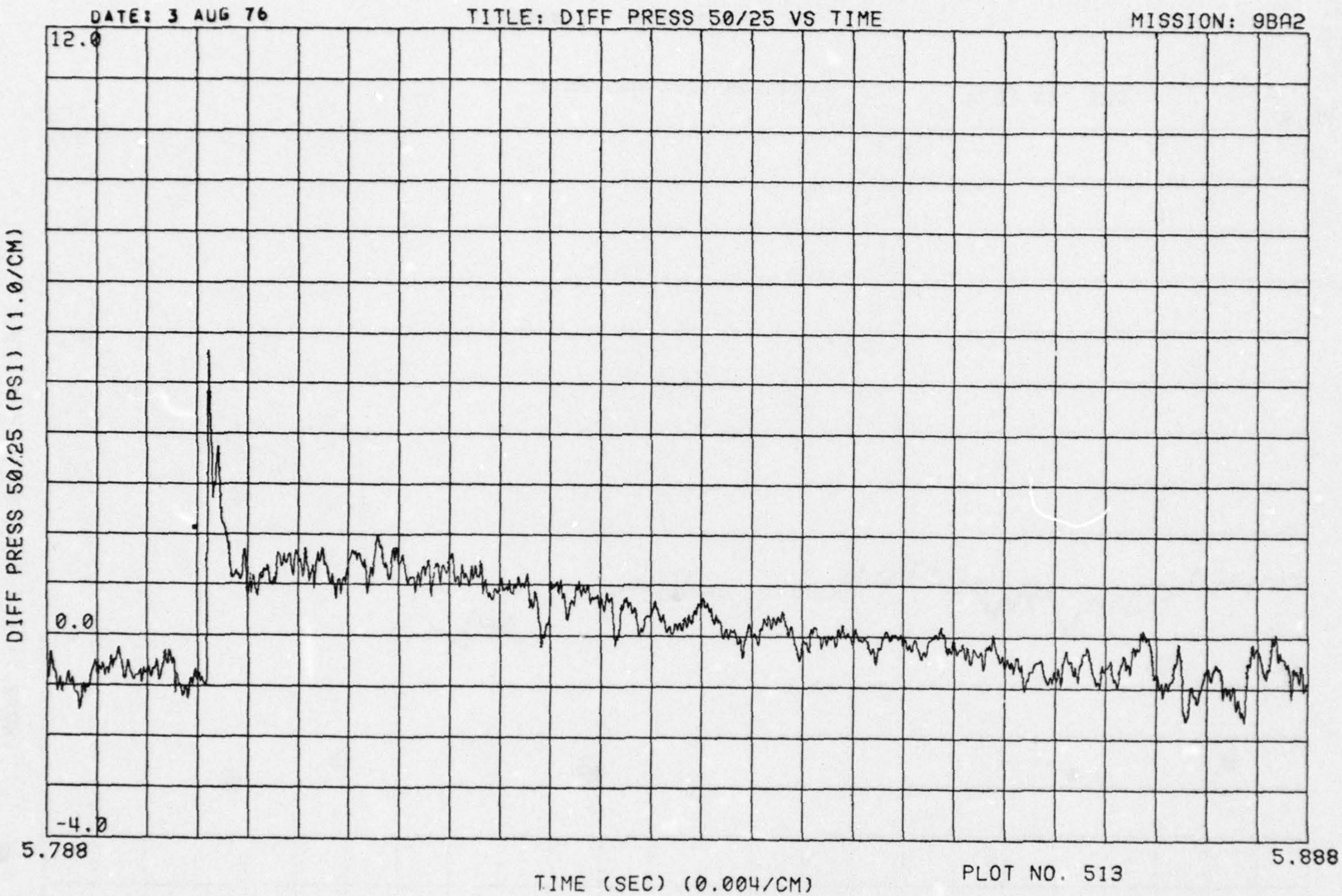


Figure 5. (Continued)

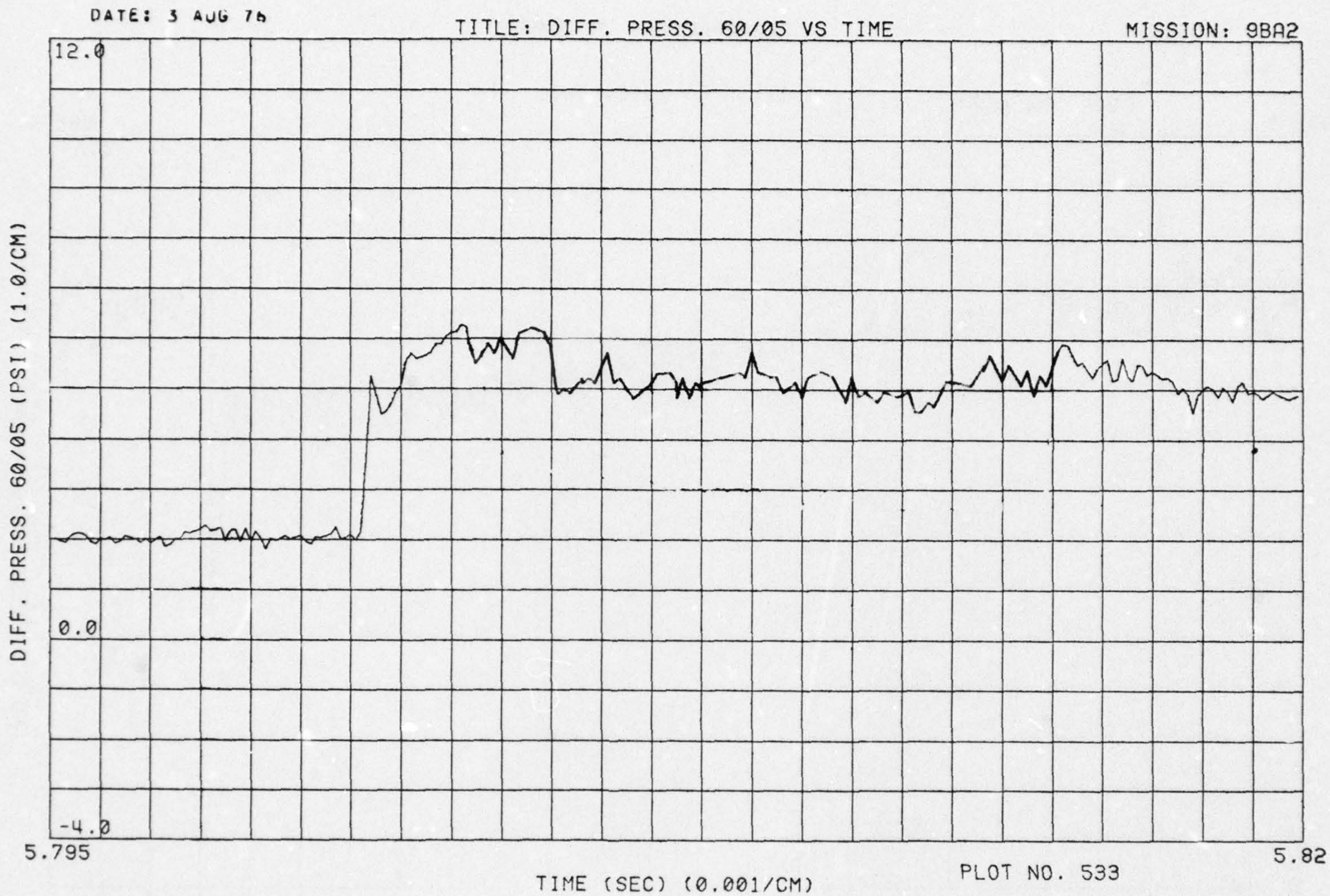


Figure 5. (Continued)

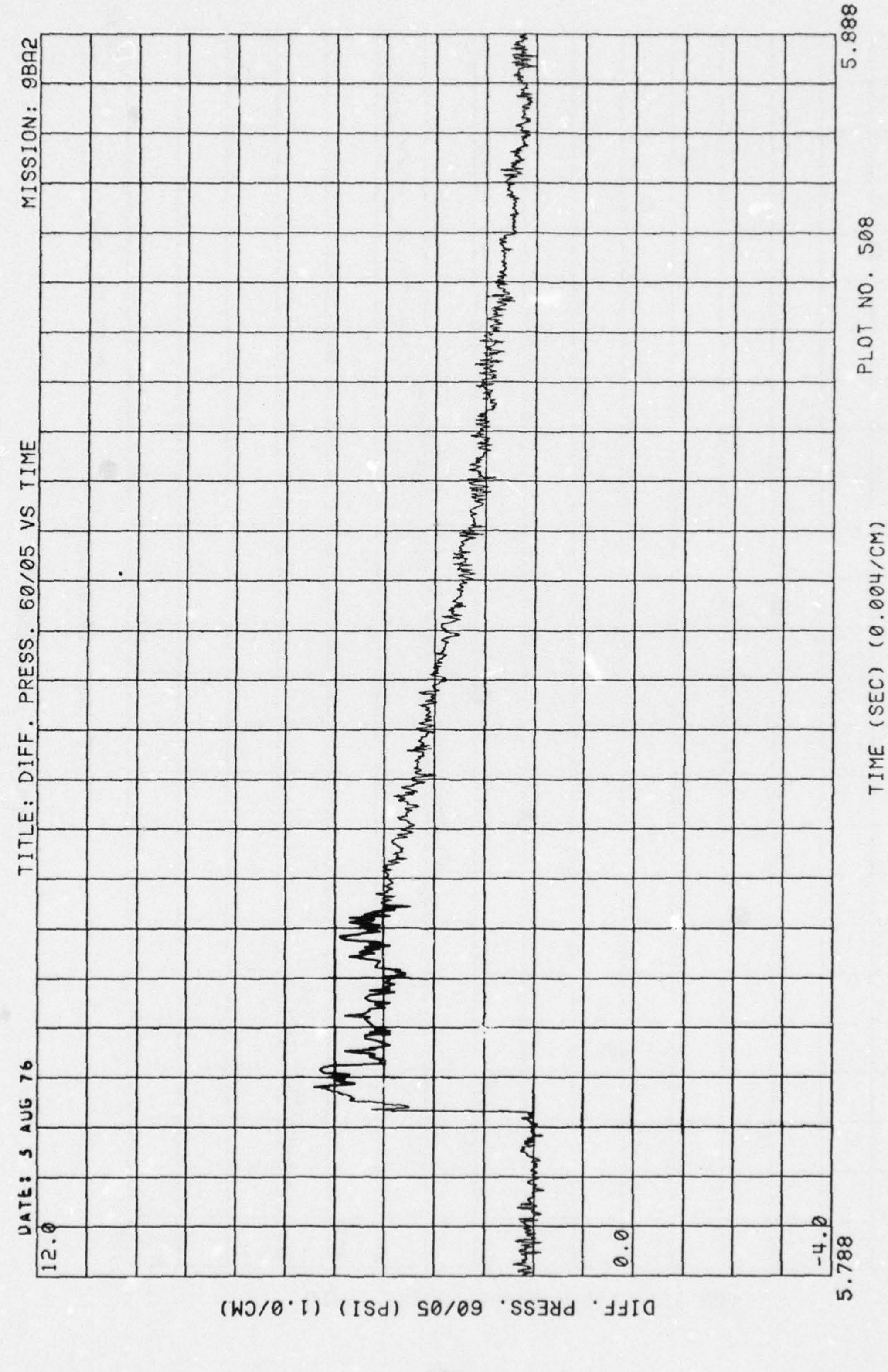


Figure 5. (Continued)

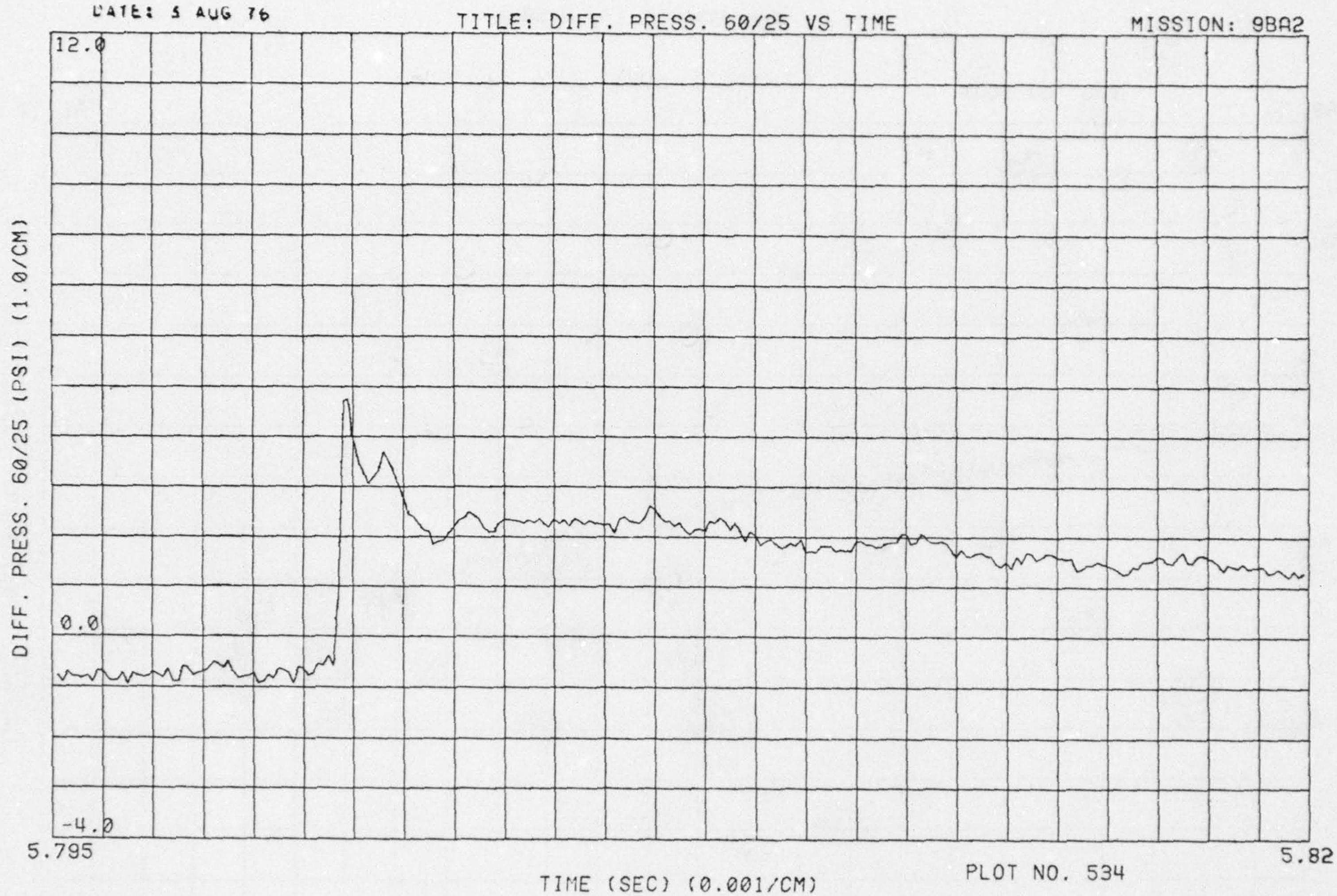


Figure 5. (Continued)

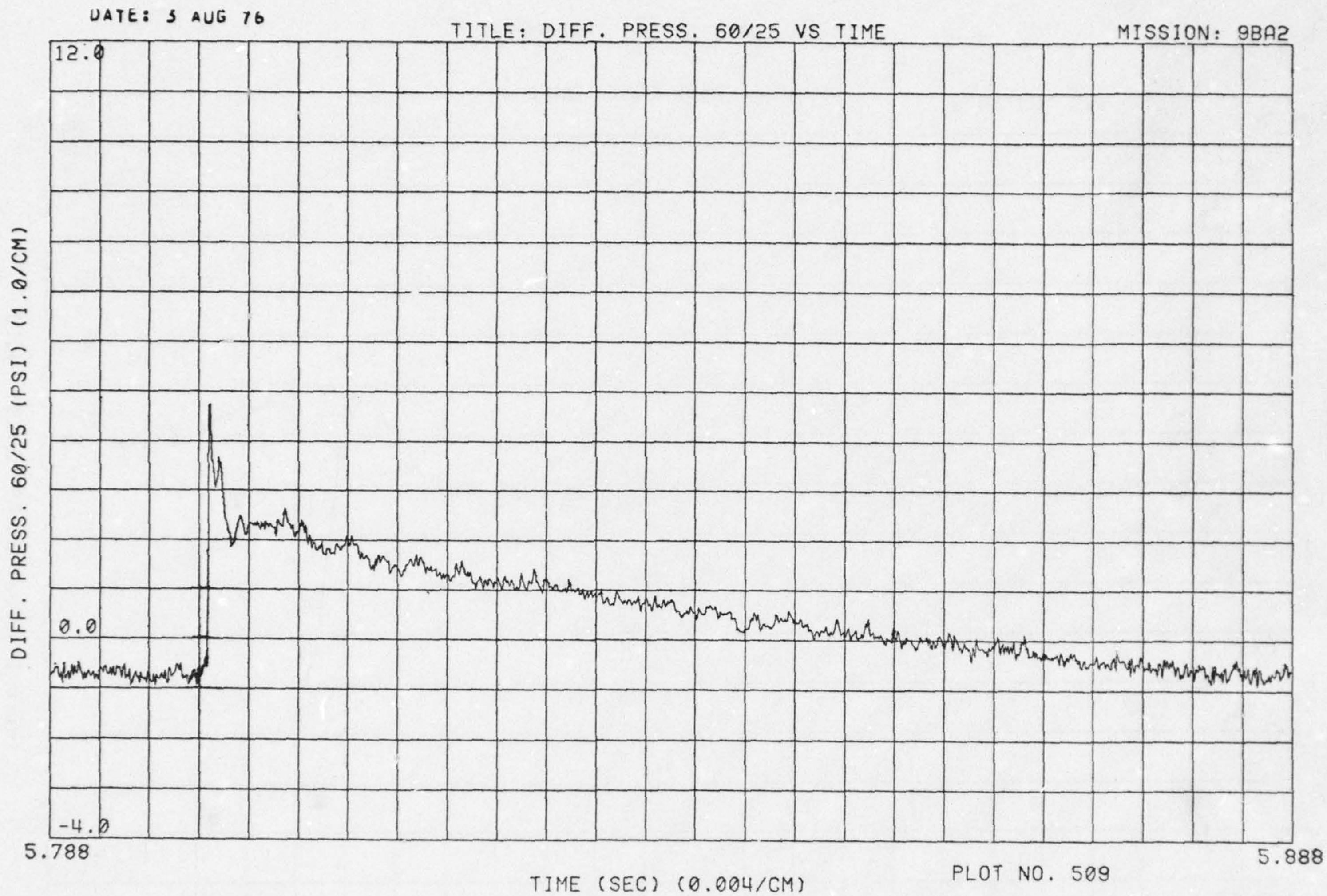


Figure 5. (Continued)

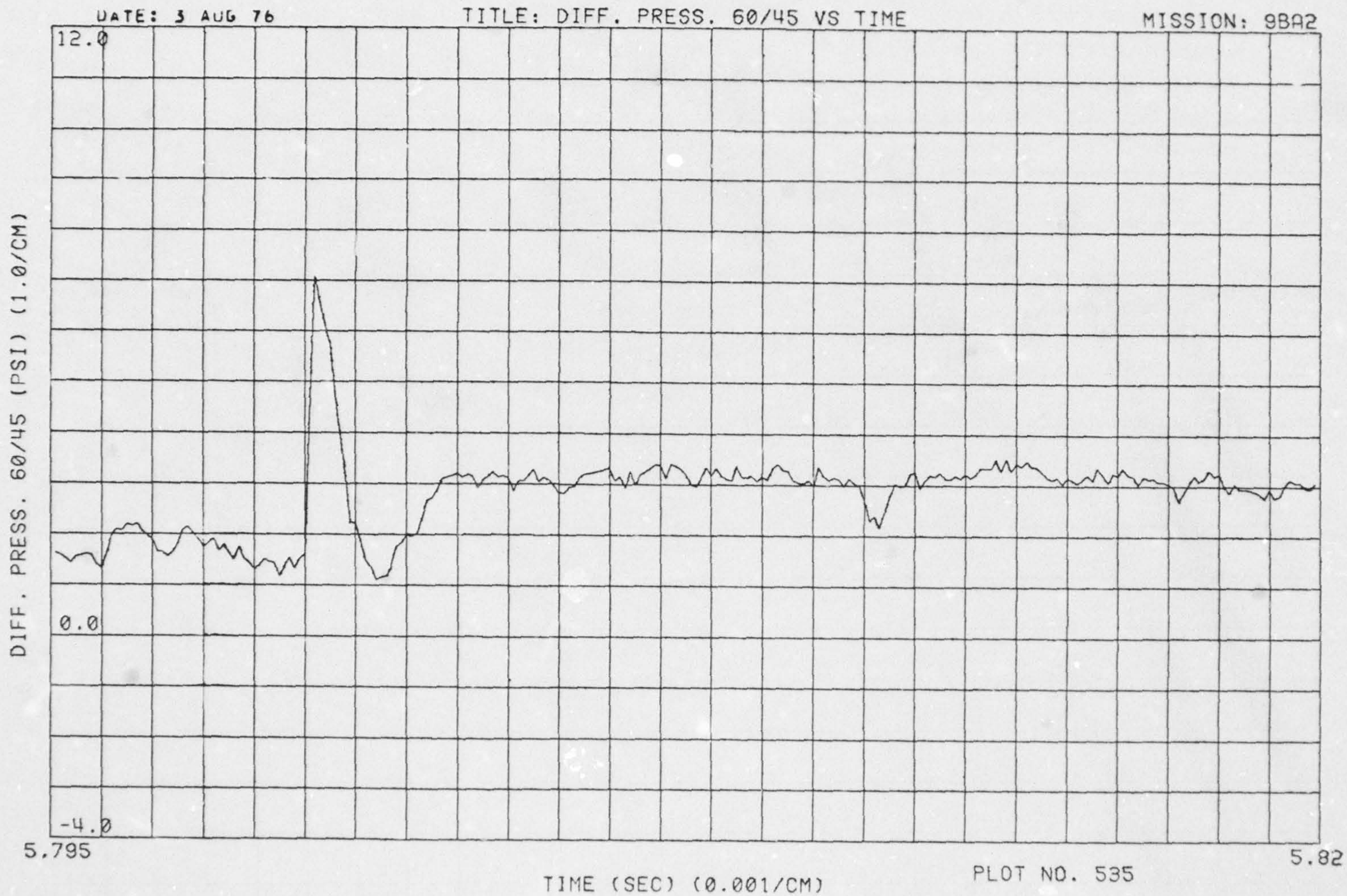


Figure 5. (Continued)

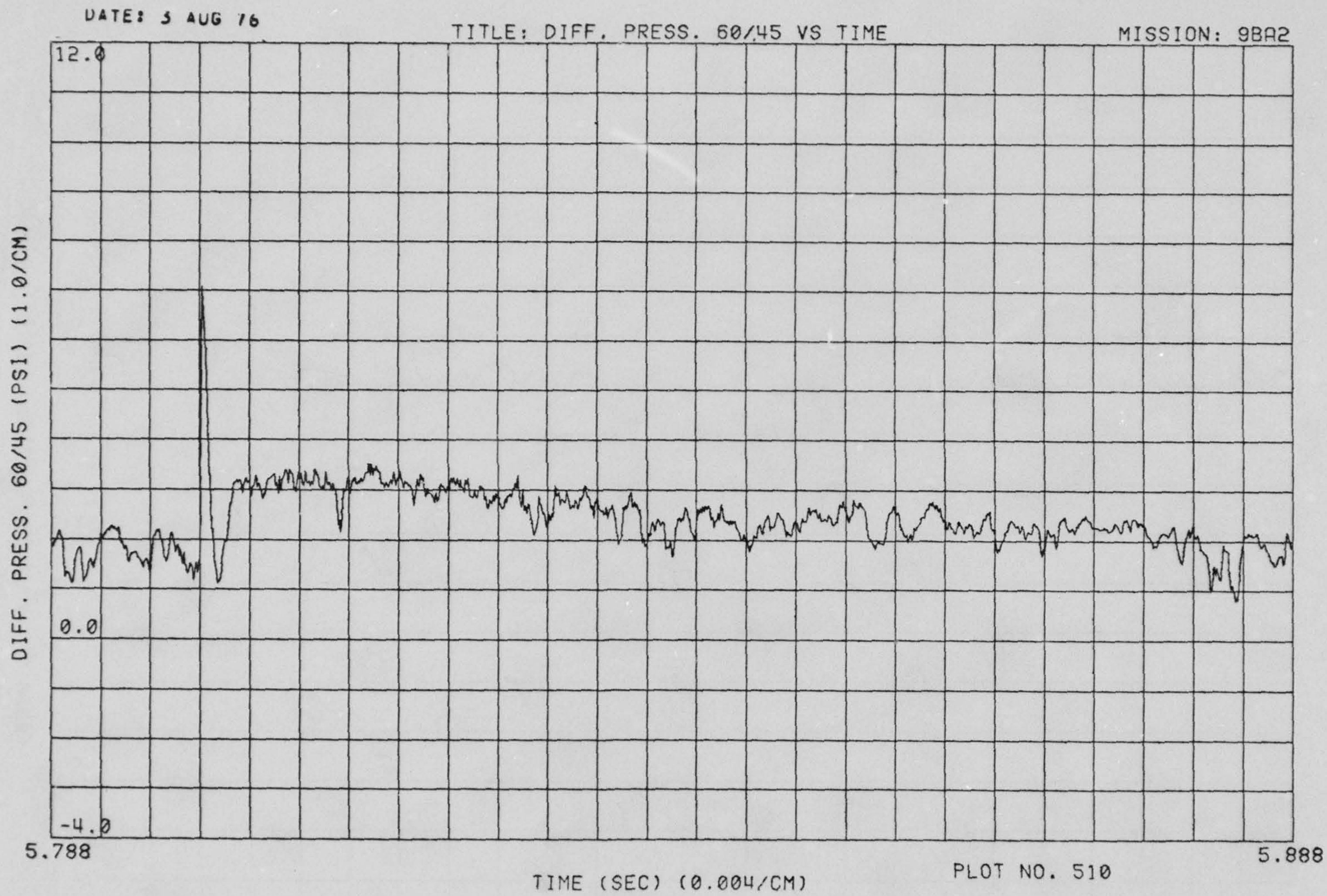


Figure 5. (Continued)

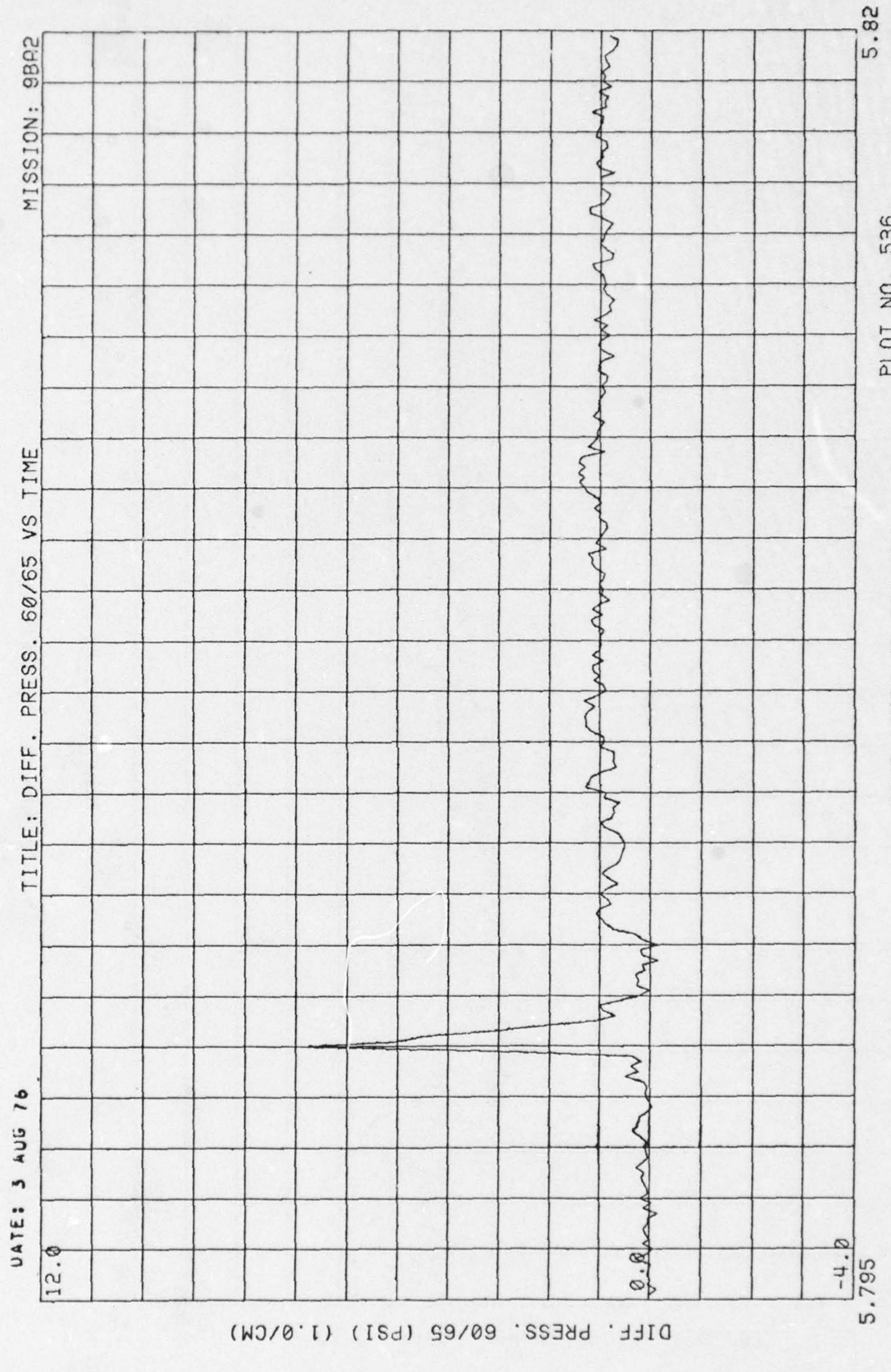


Figure 5. (Continued)

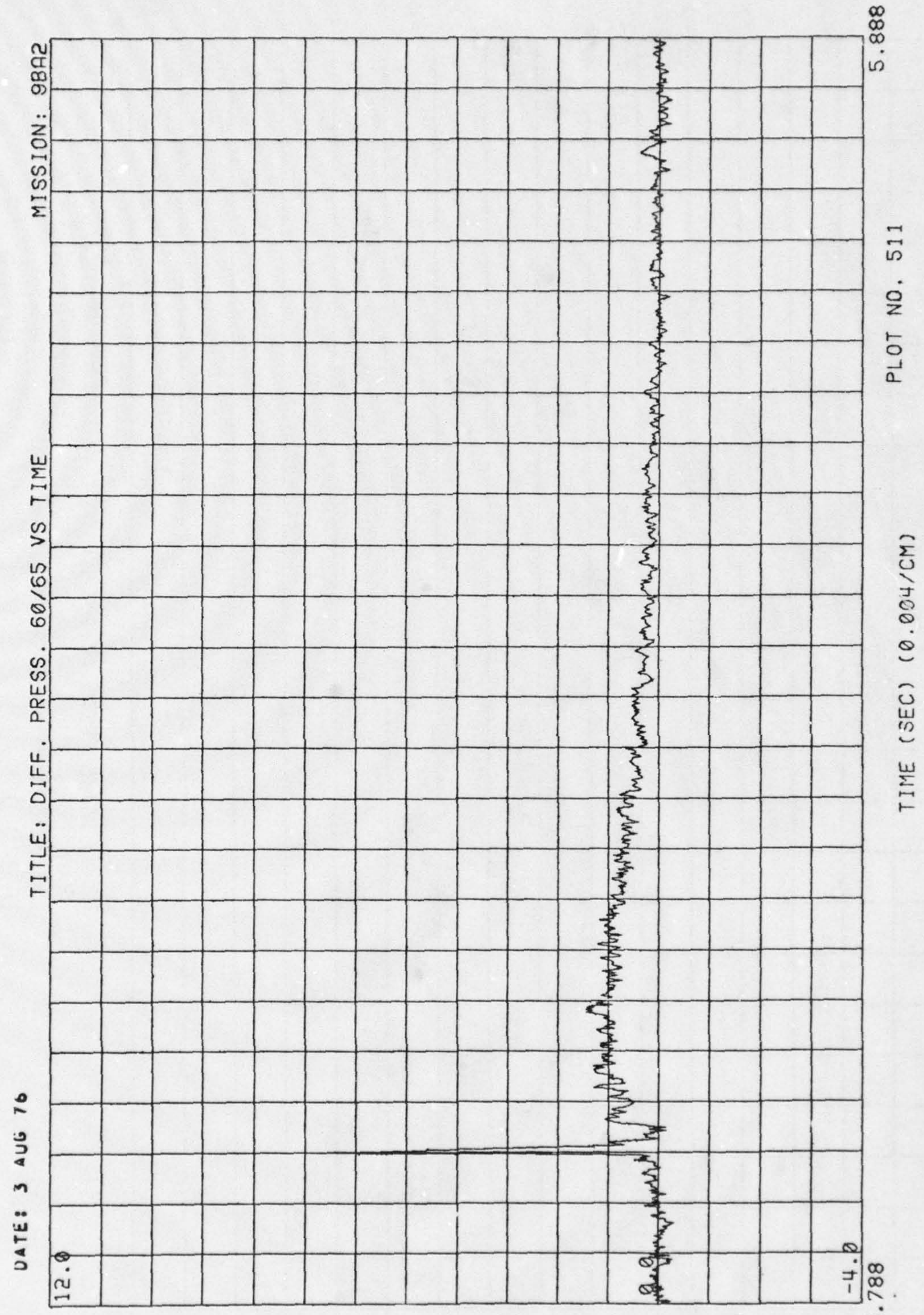


Figure 5. (Continued)

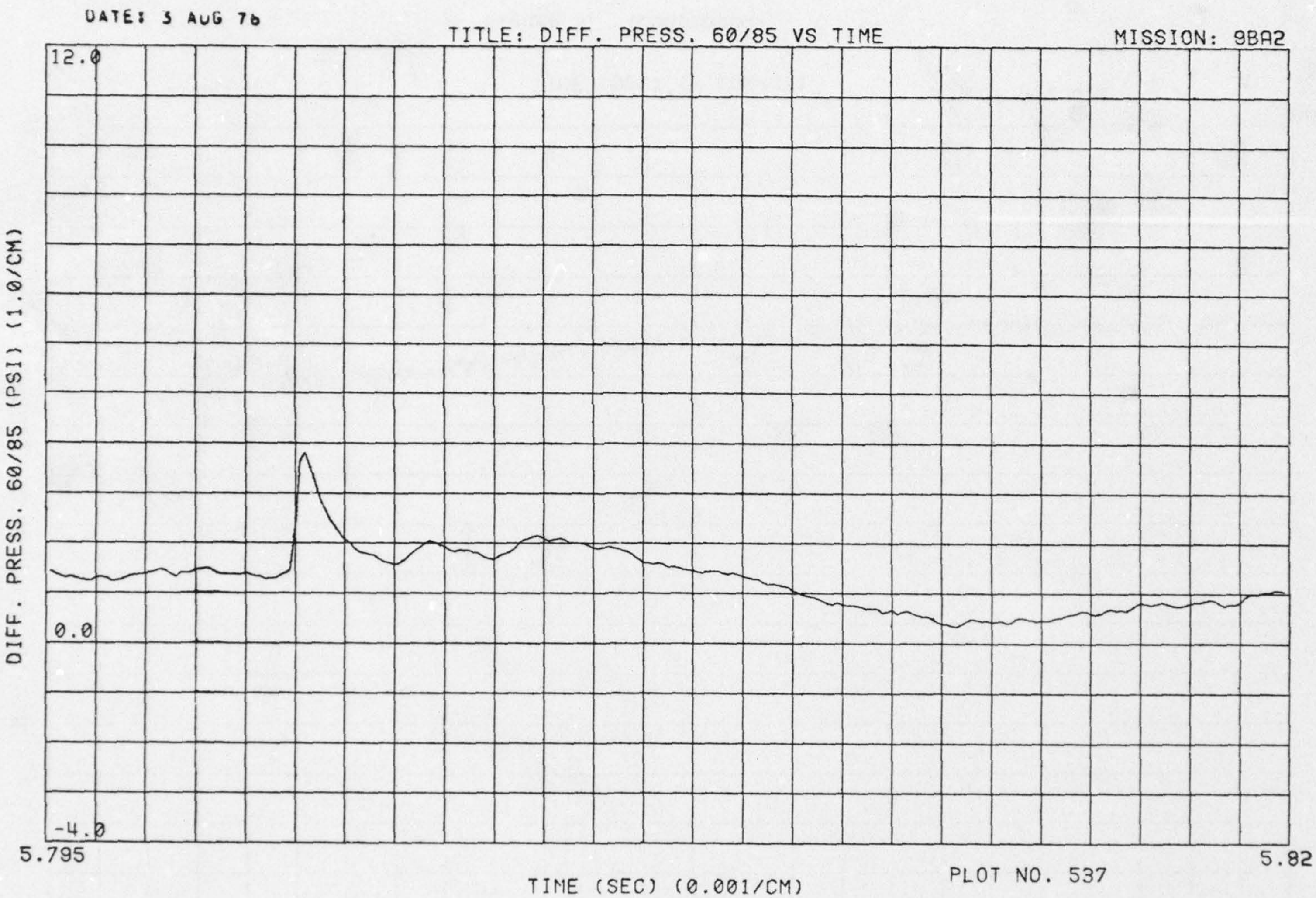


Figure 5. (Continued)

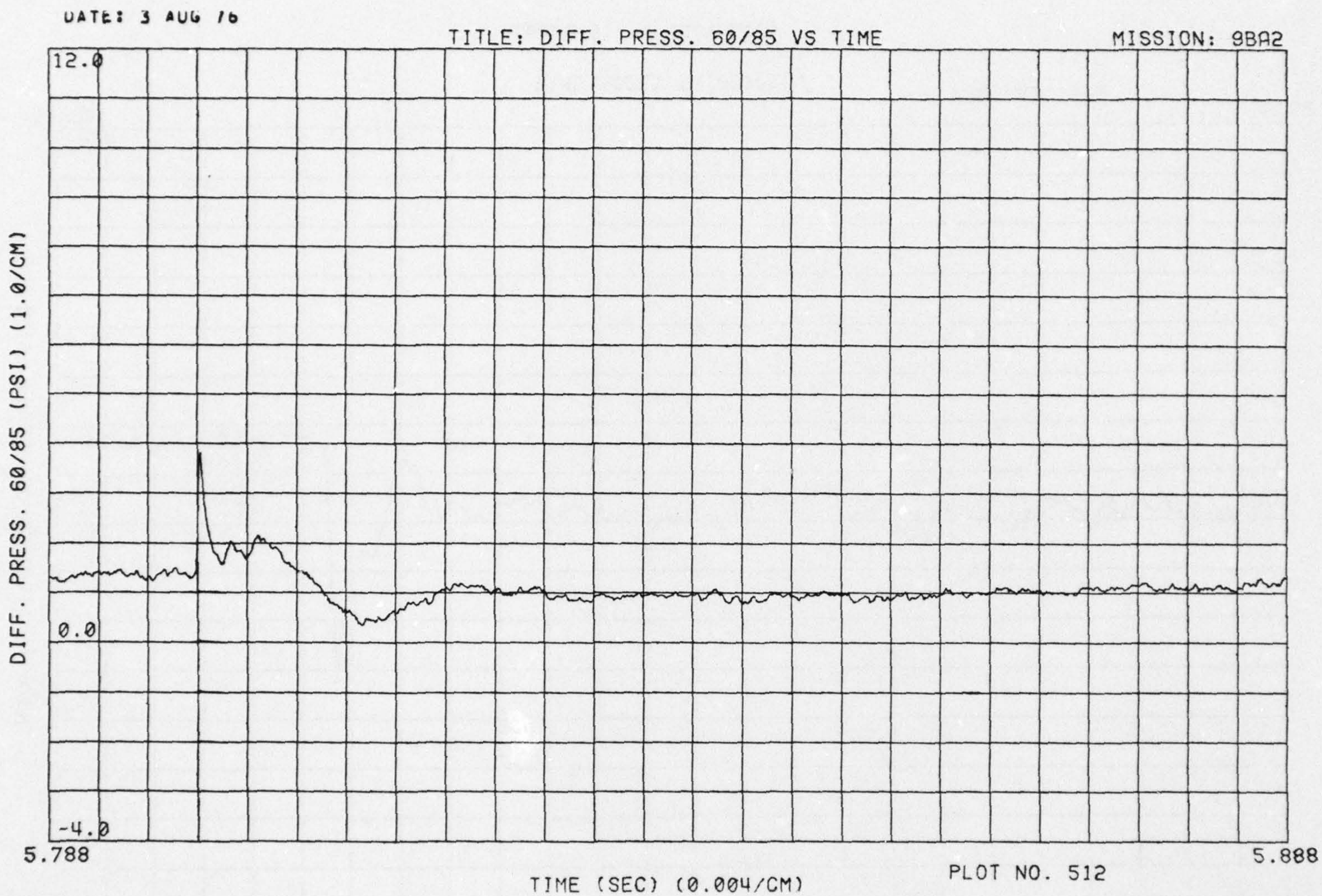


Figure 5. (Continued)

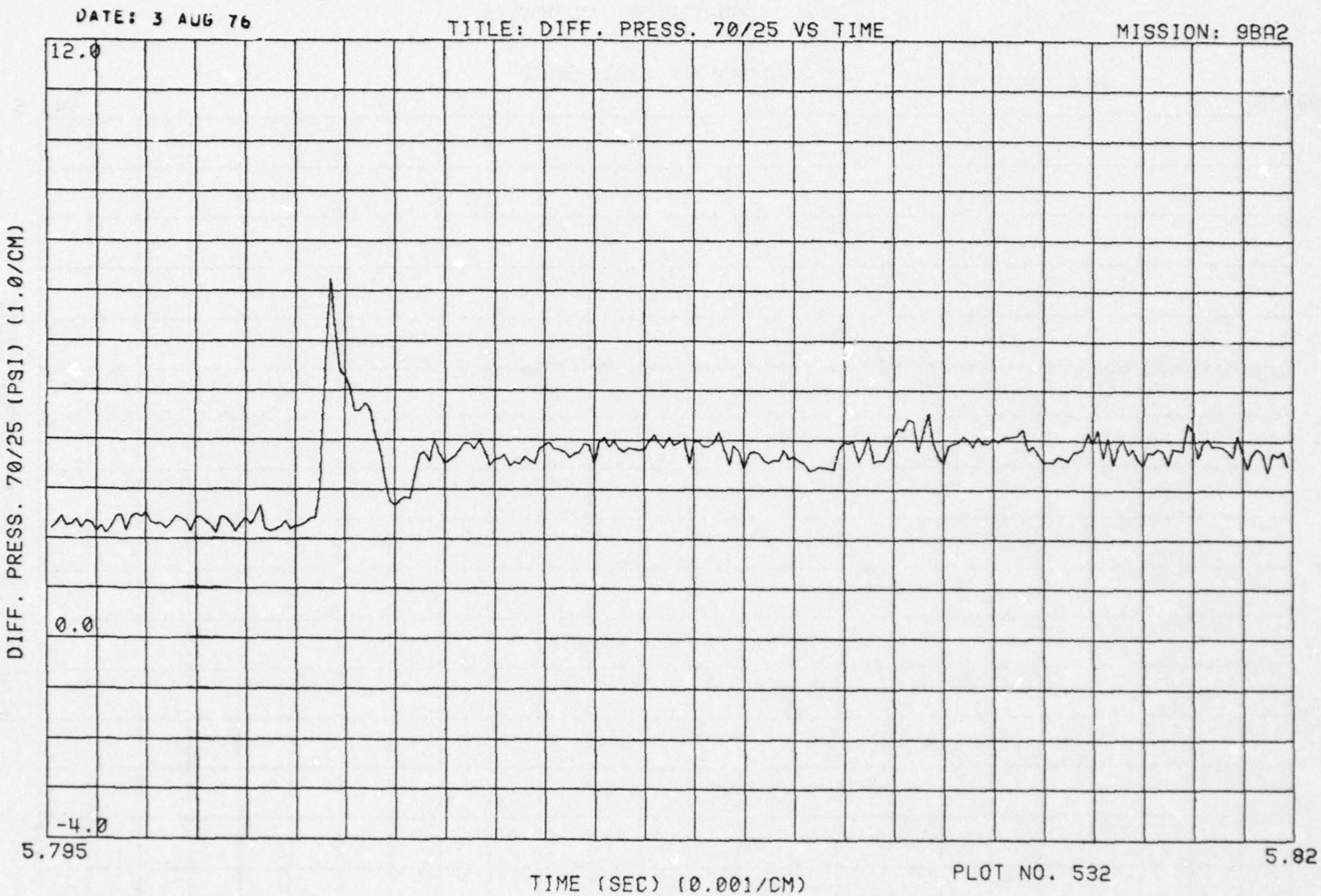


Figure 5. (Continued)

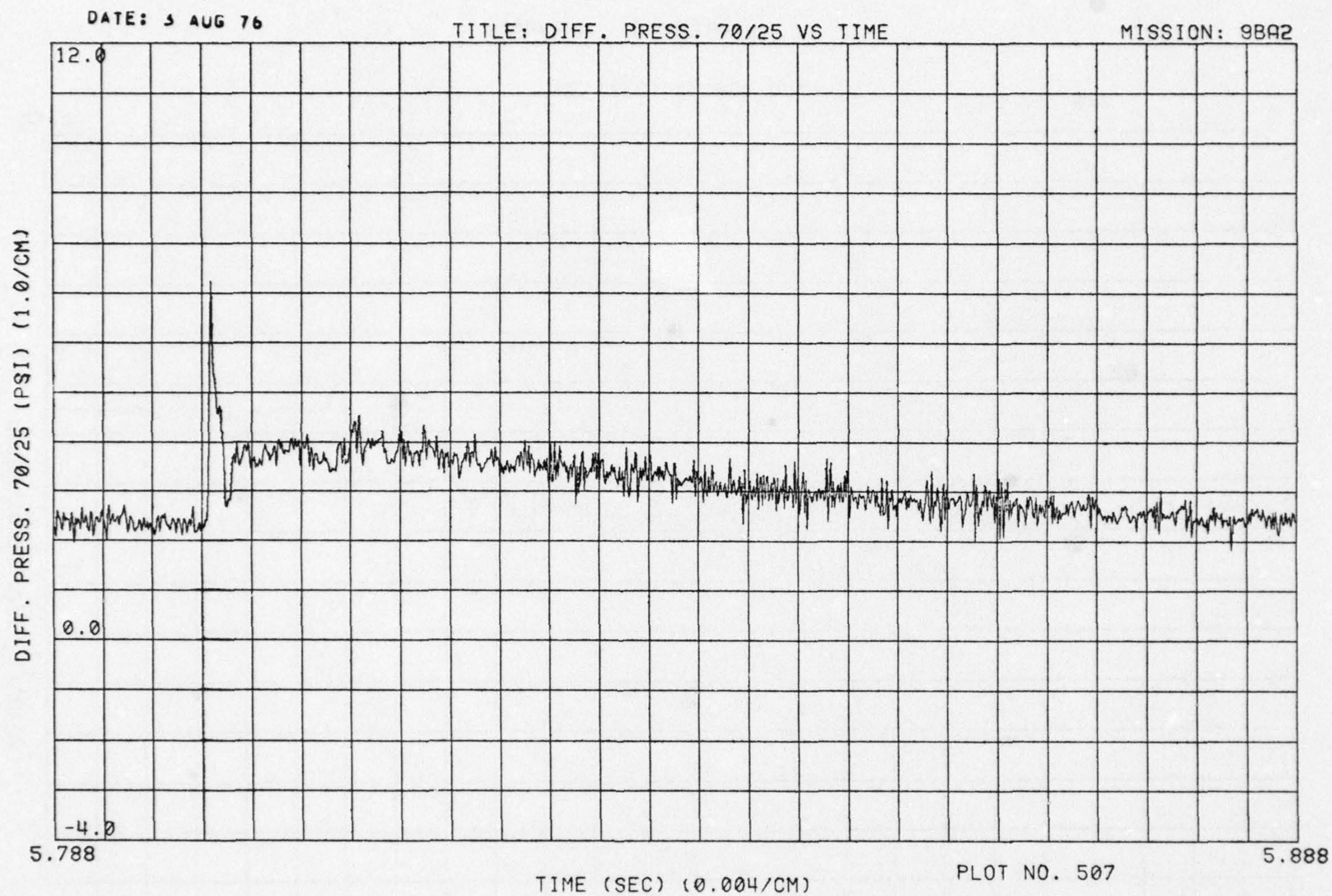


Figure 5. (Continued)

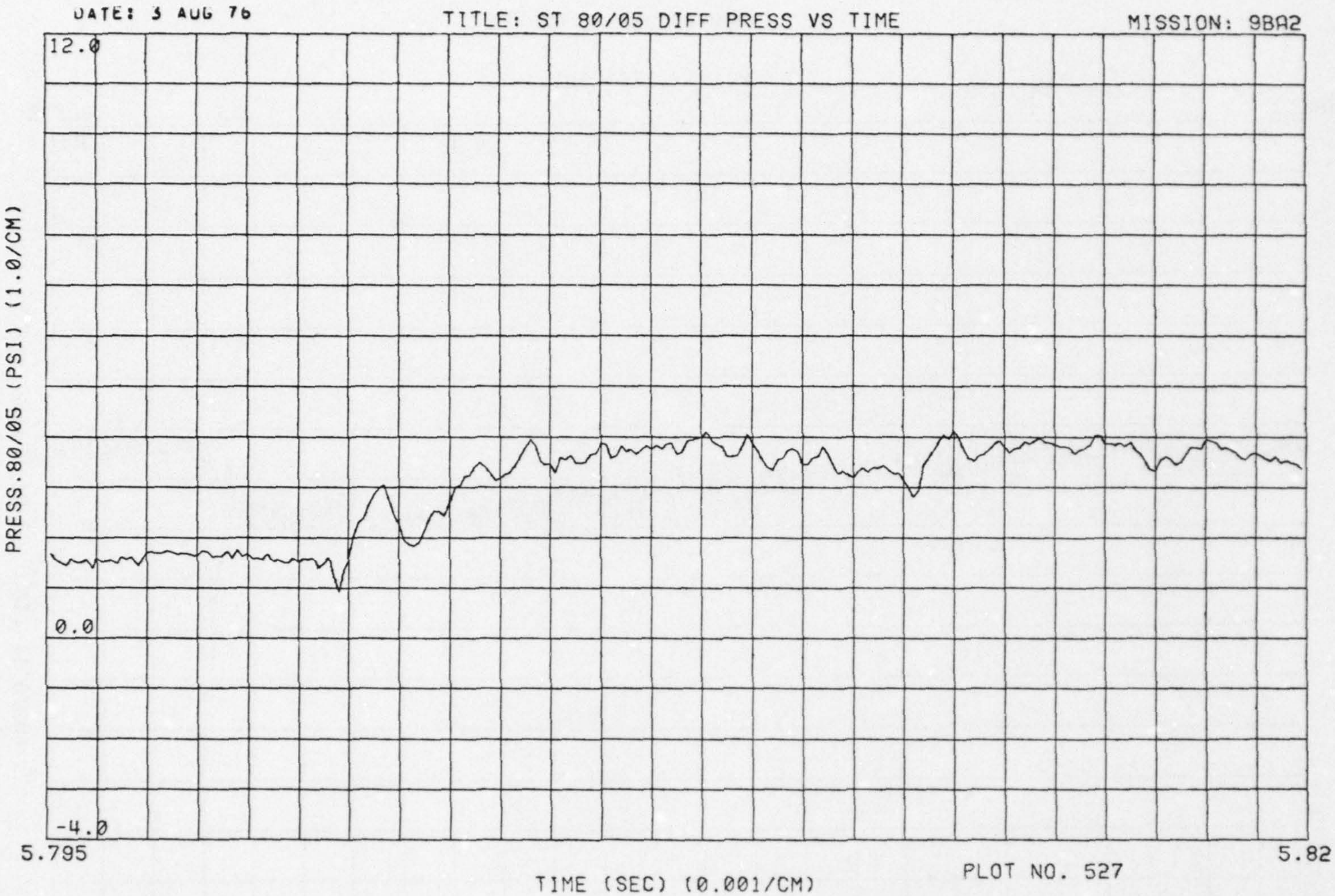


Figure 5. (Continued)

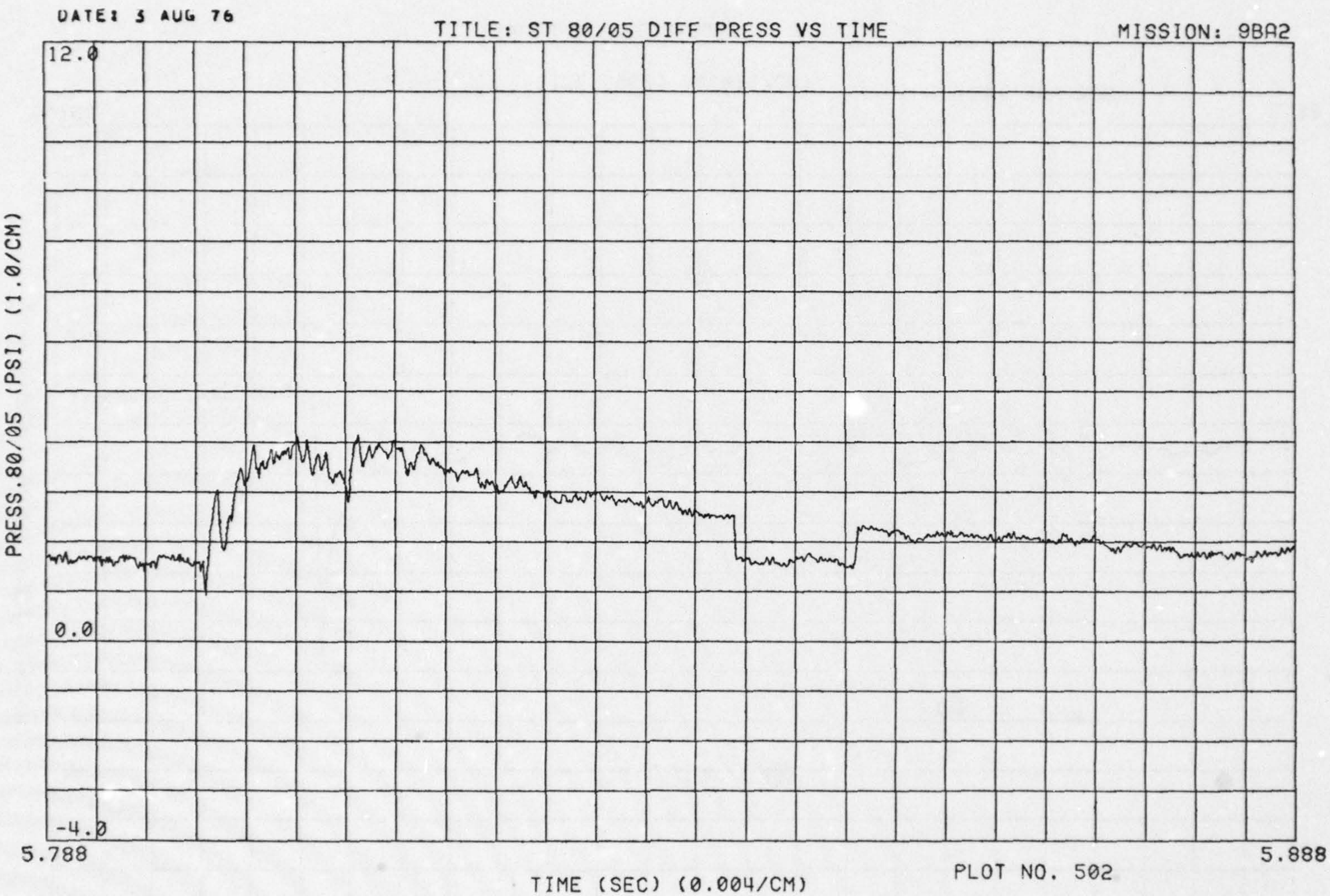


Figure 5. (Continued)

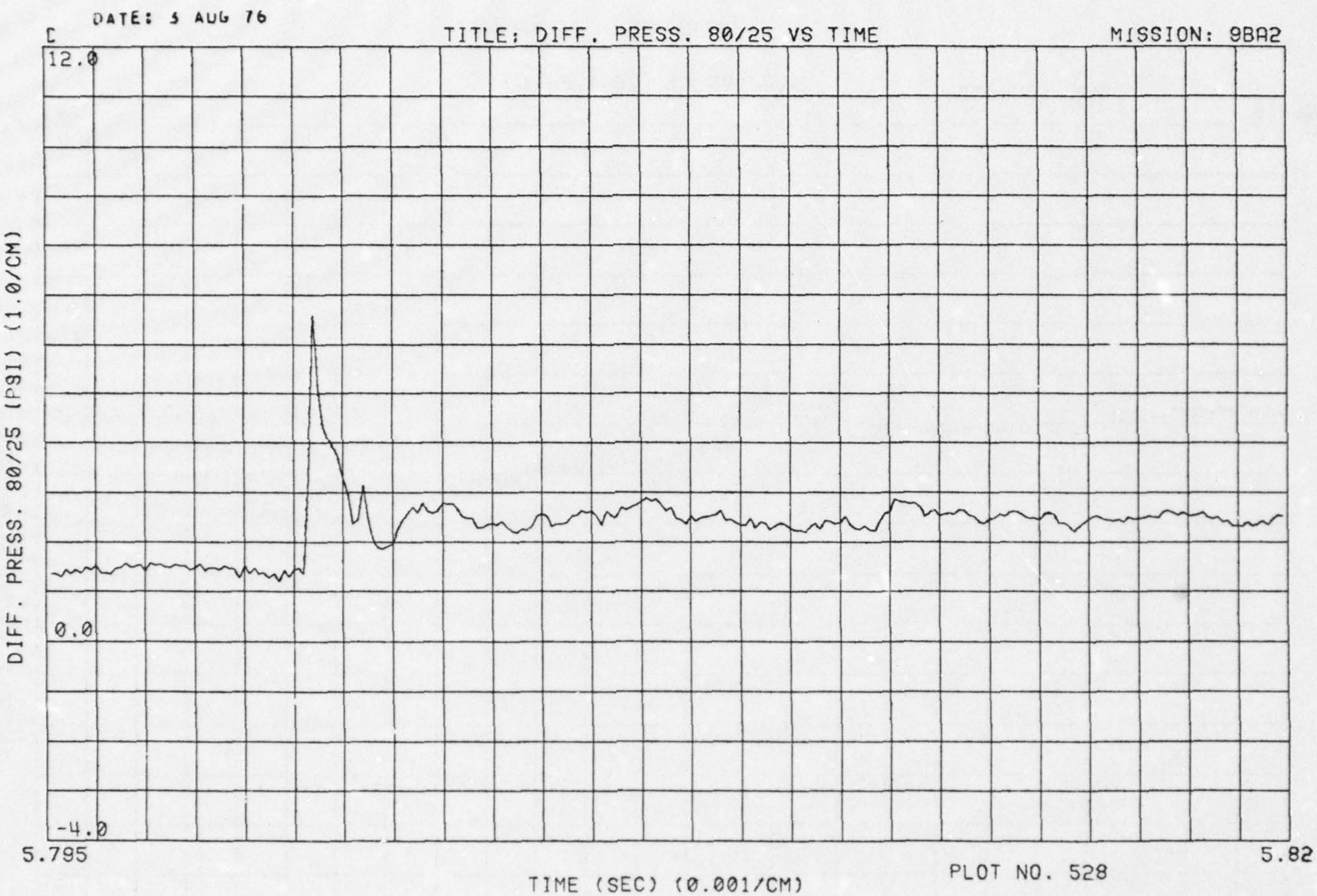


Figure 5. (Continued)

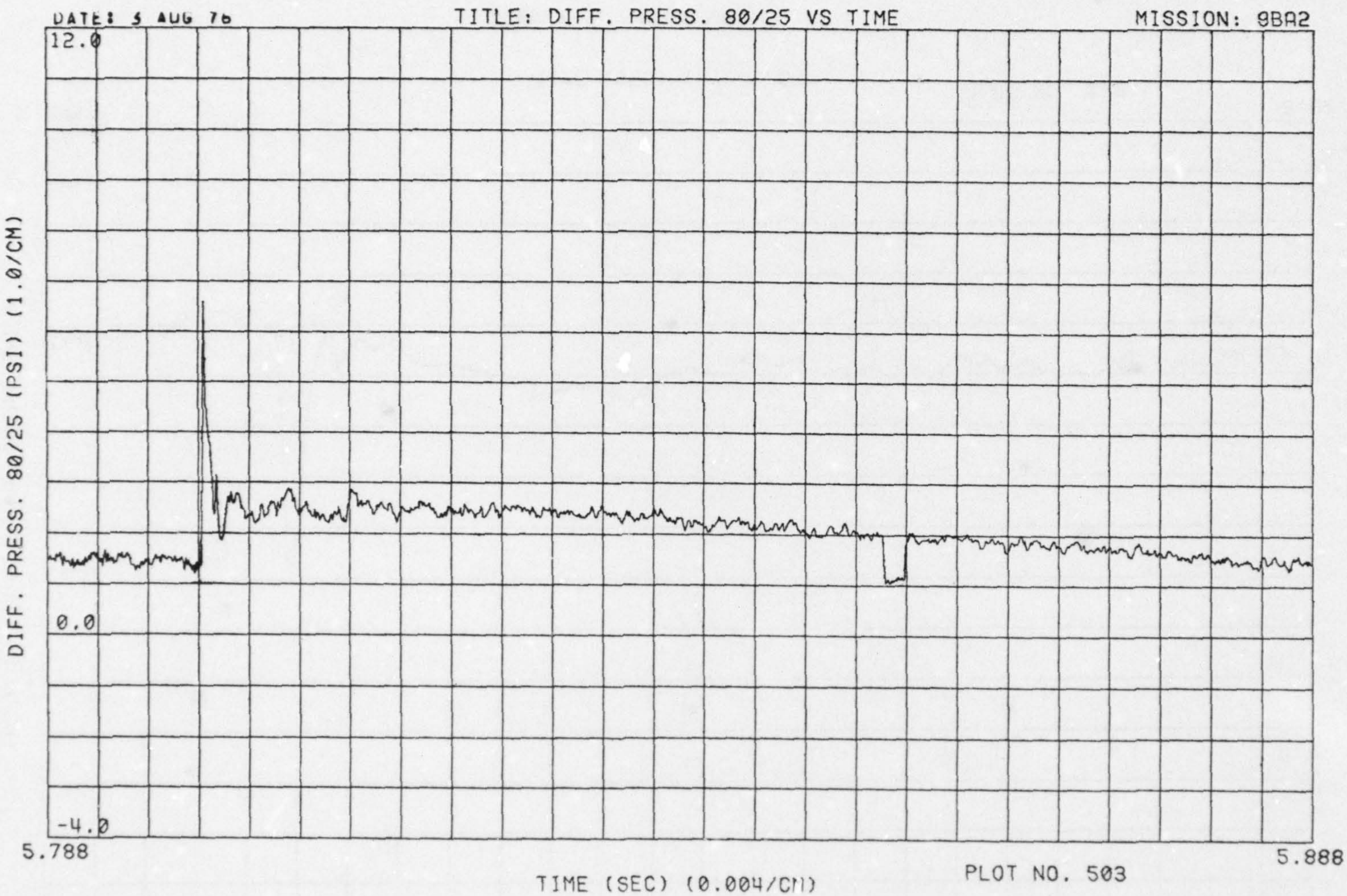


Figure 5. (Continued)

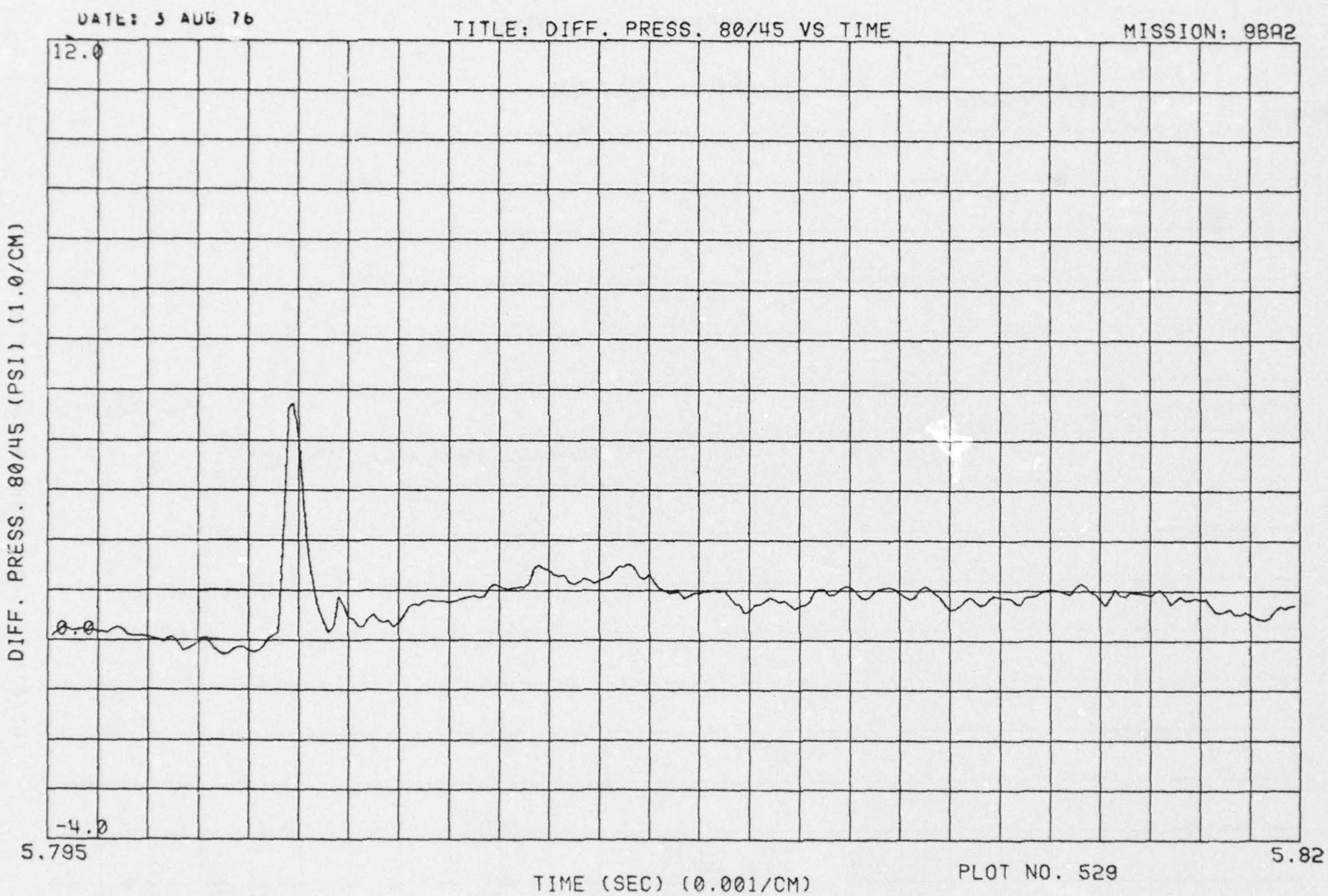


Figure 5. (Continued)

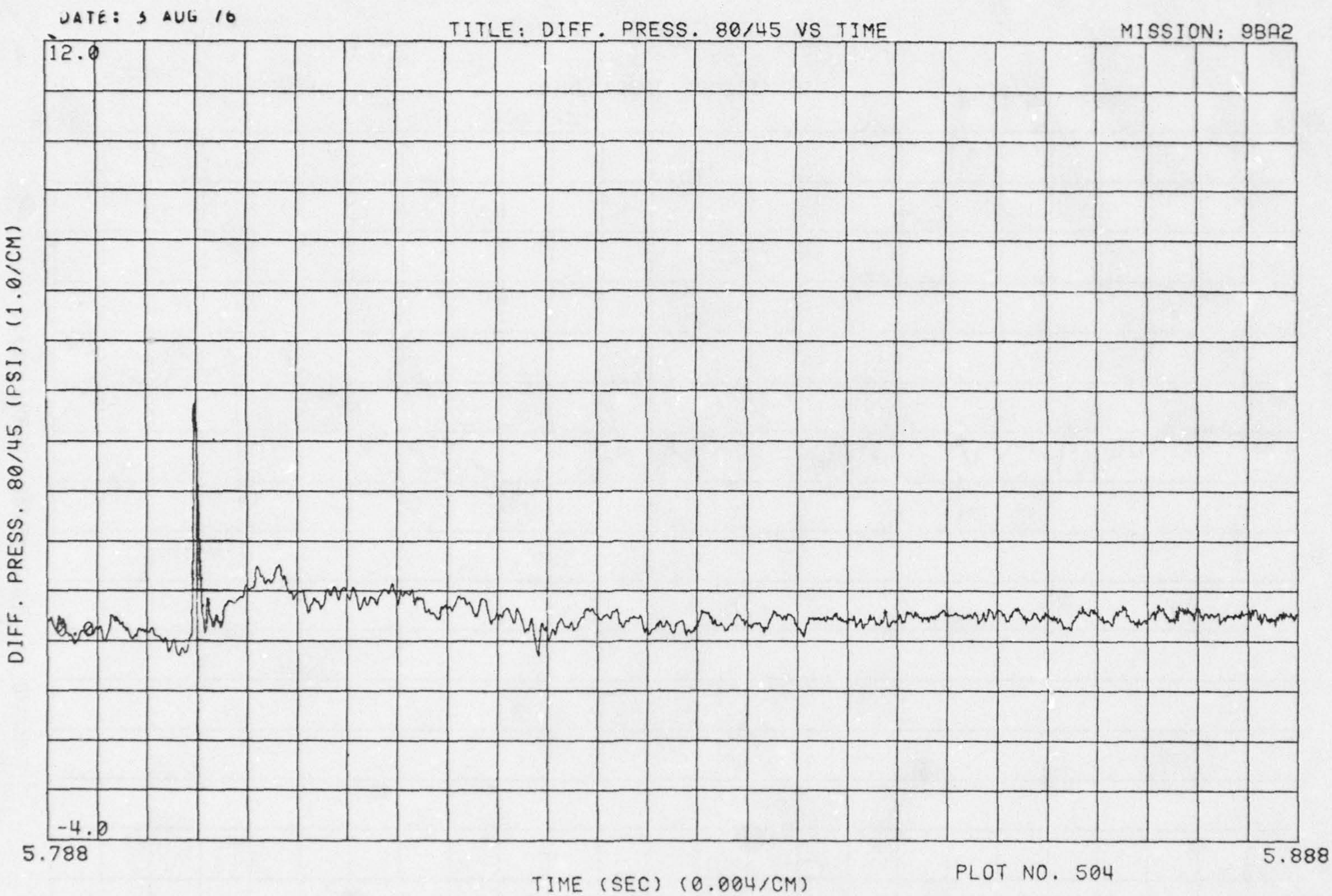


Figure 5. (Continued)

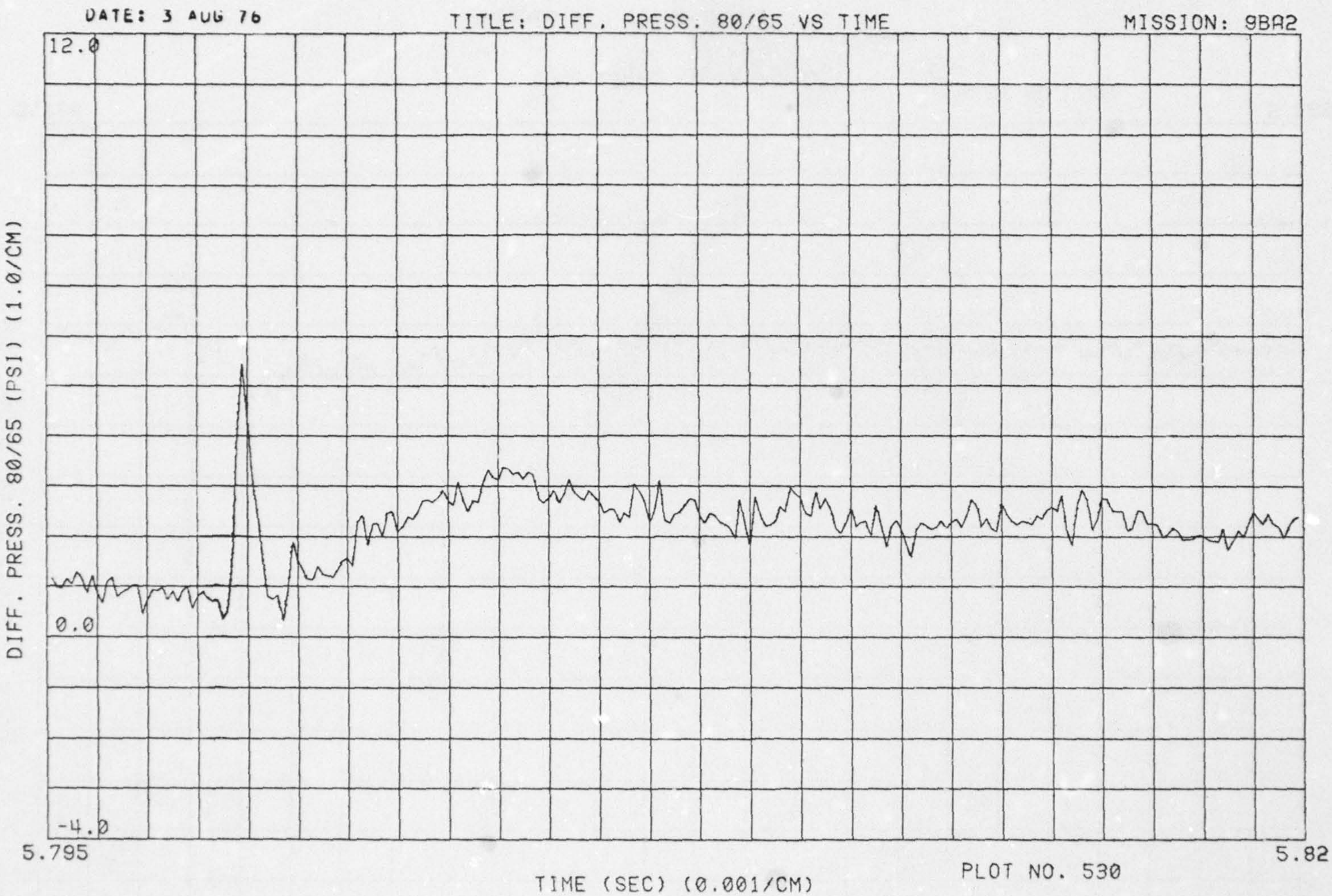


Figure 5. (Continued)

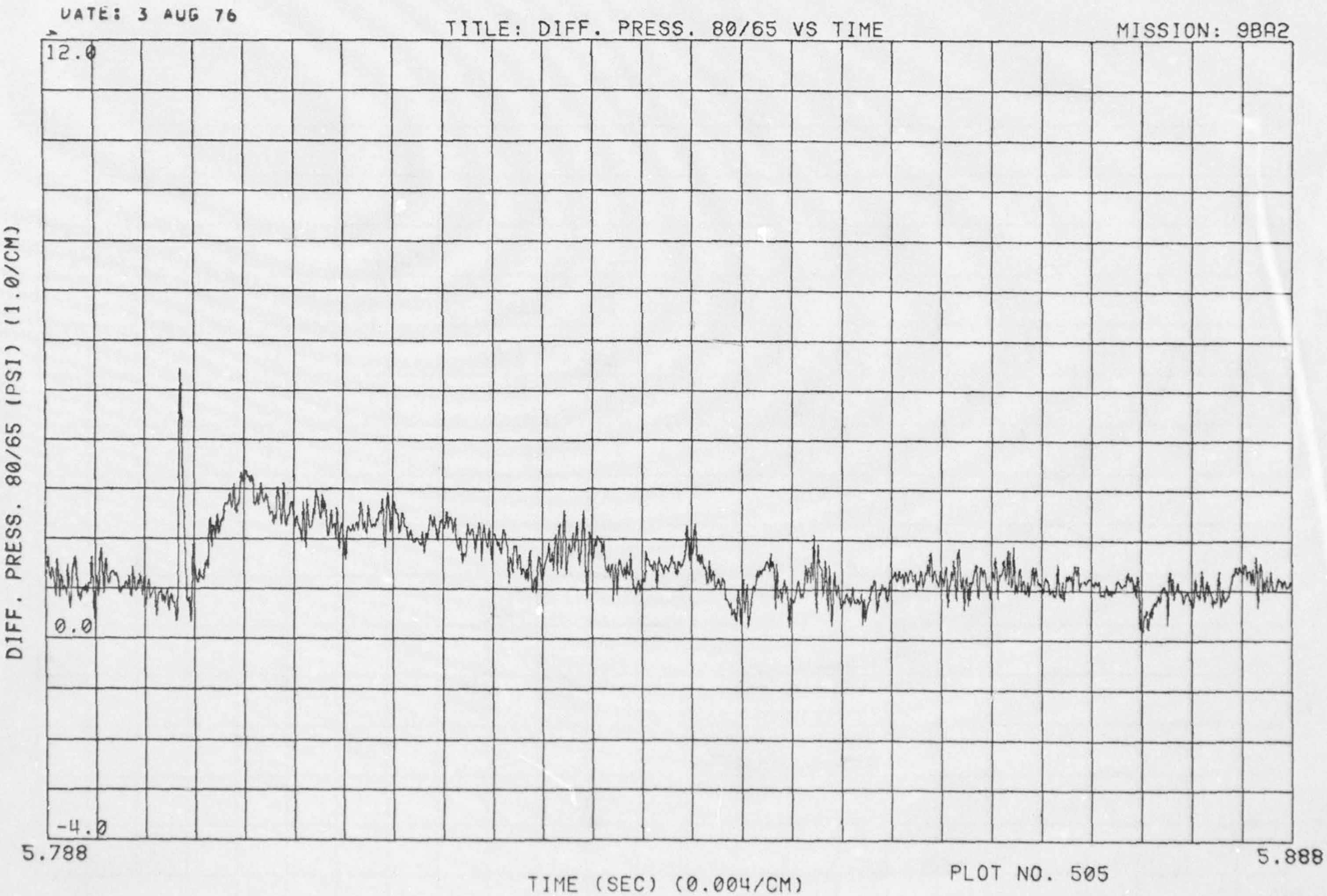


Figure 5. (Continued)

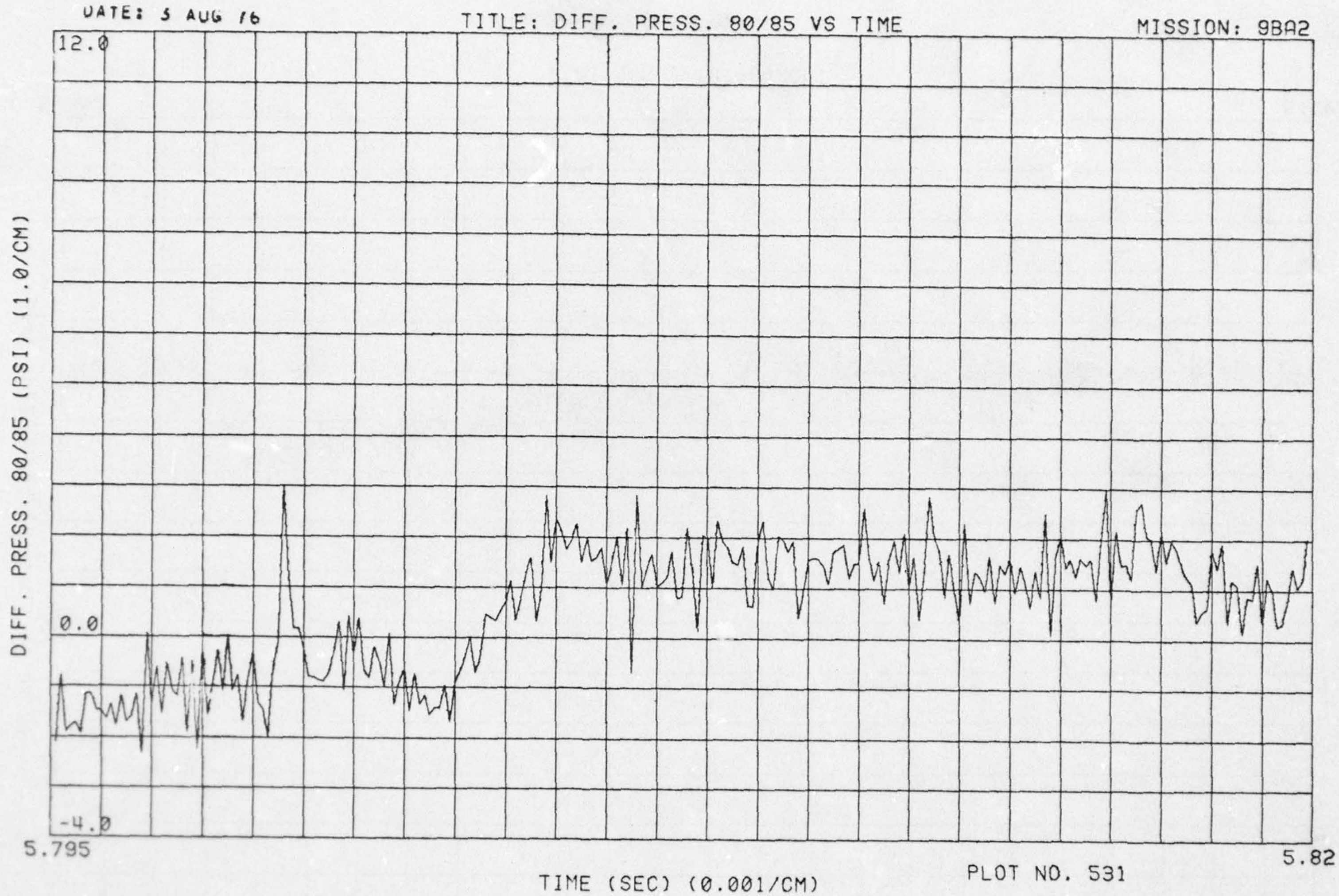


Figure 5. (Continued)

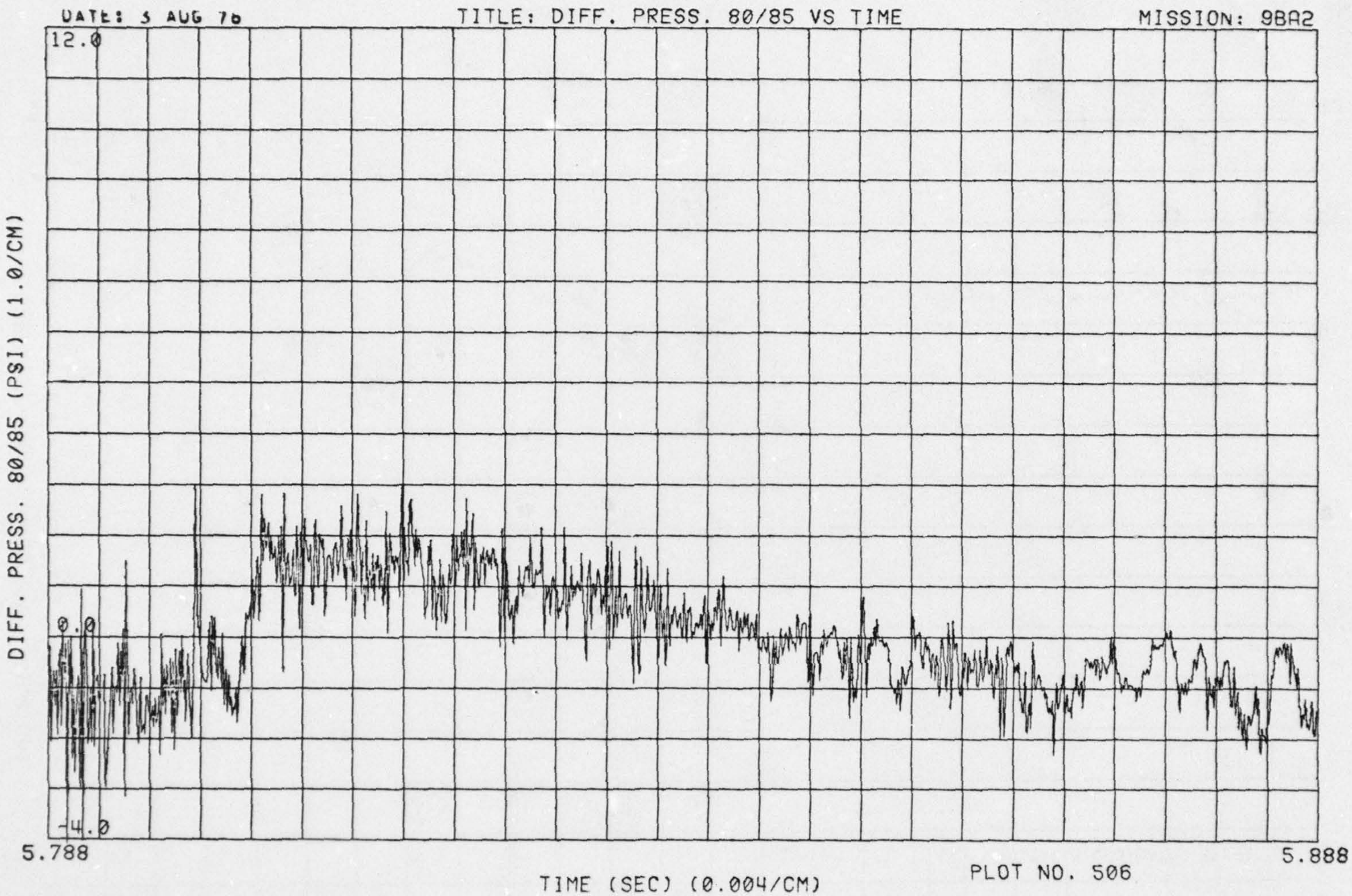


Figure 5. (Continued)

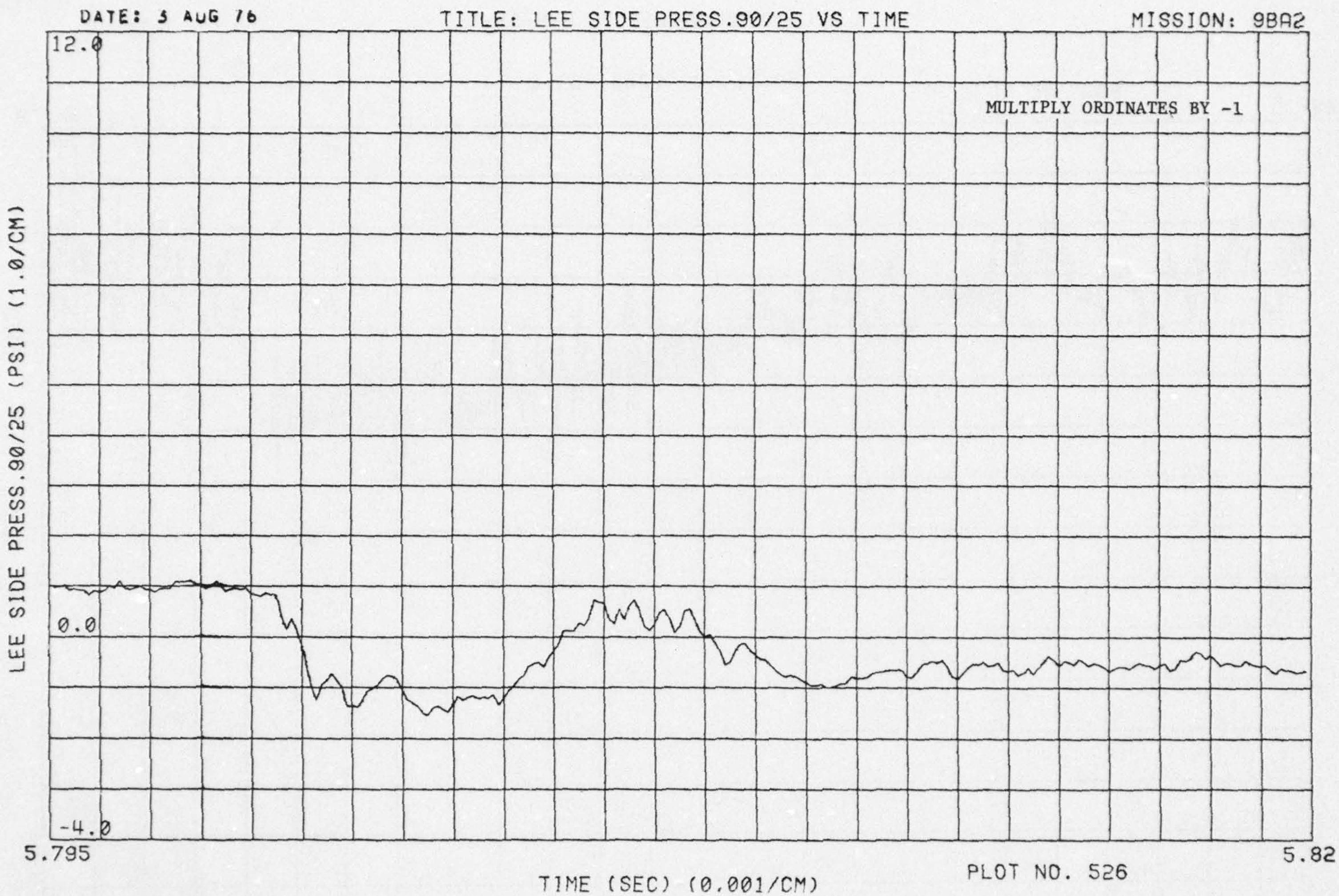


Figure 5. (Continued)

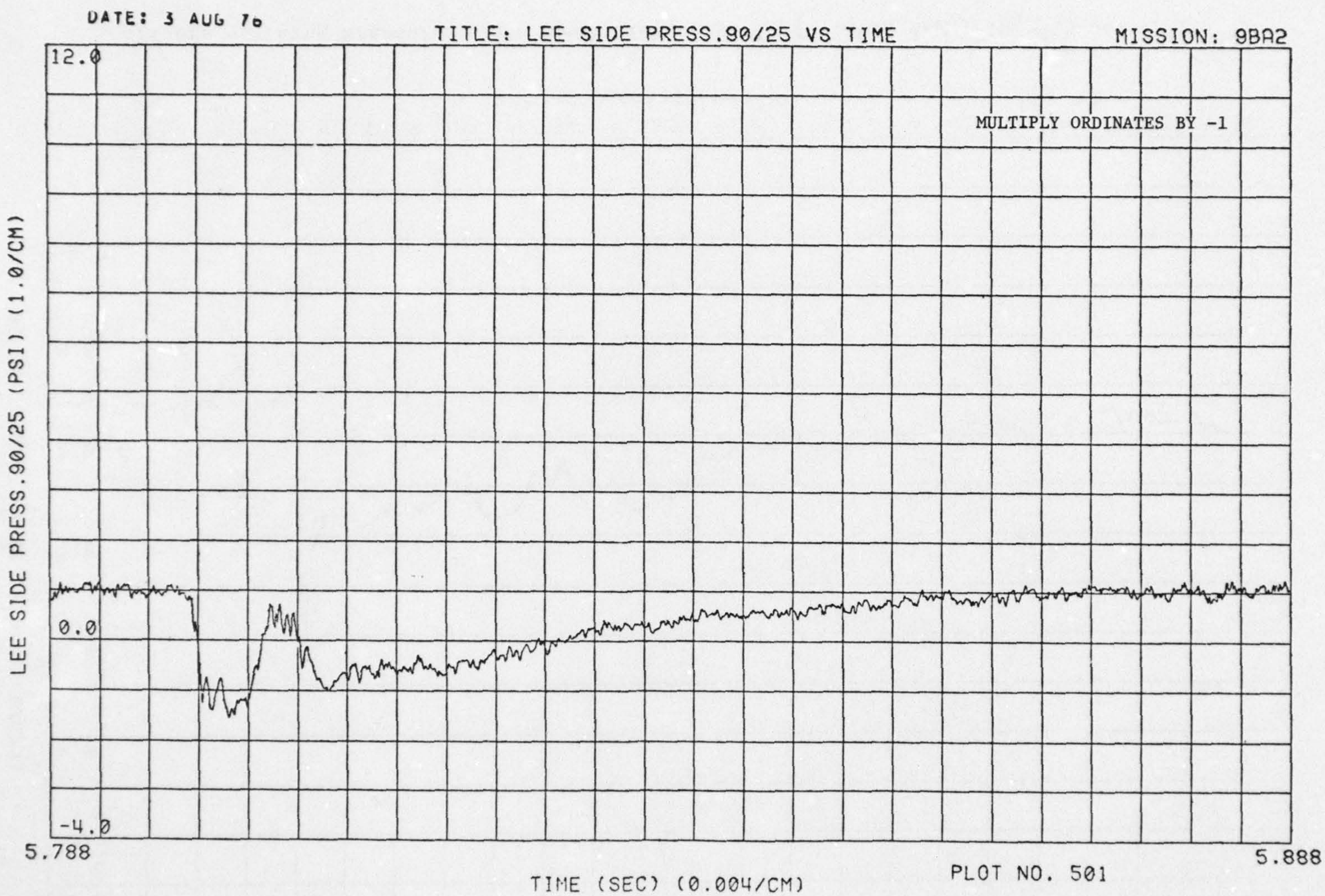


Figure 5. (Continued)

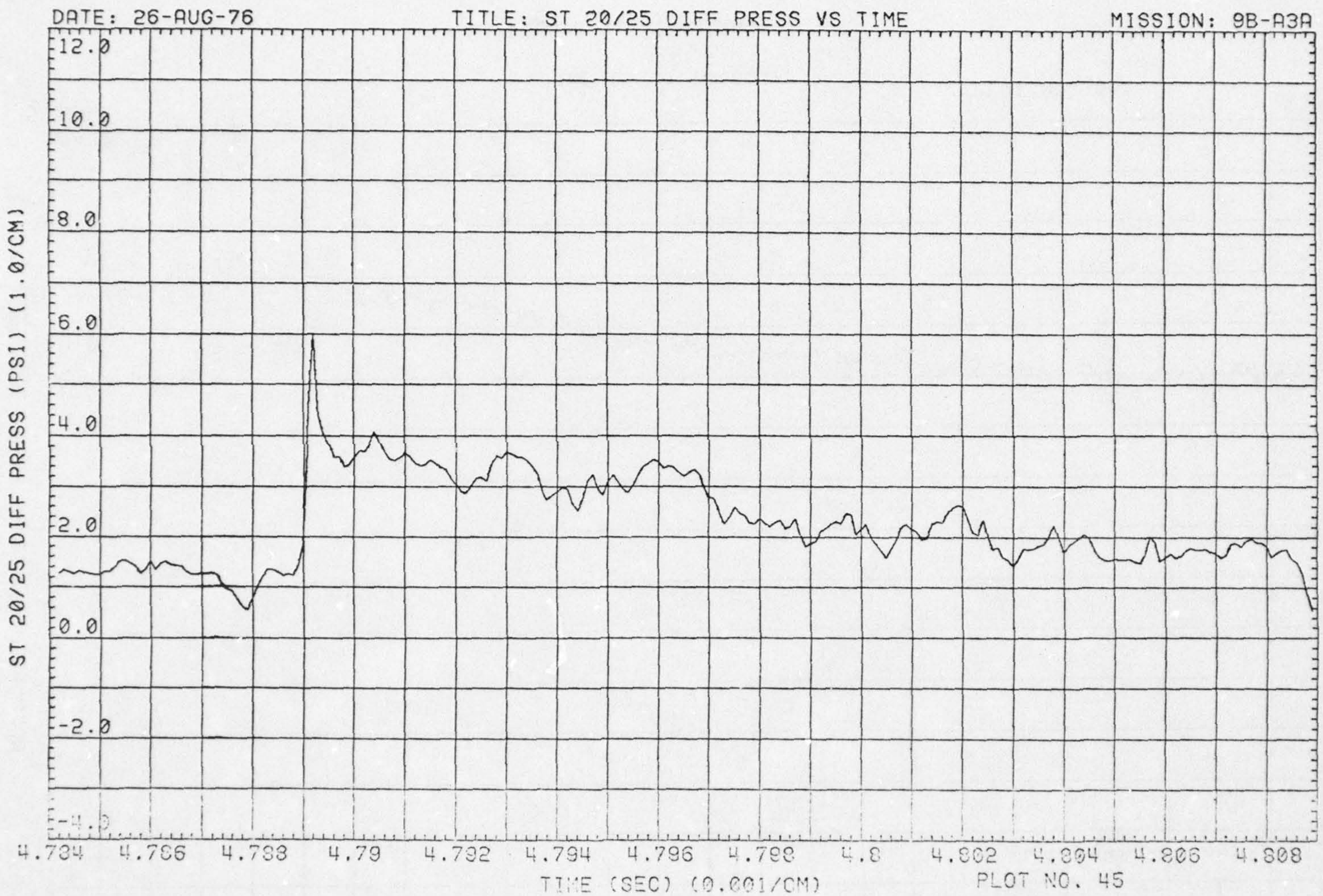


Figure 6. Wing Pressures, Run 9B-A3. Intercept 1, ϕ = 20.1 deg., Δp_s=3.6 psi.

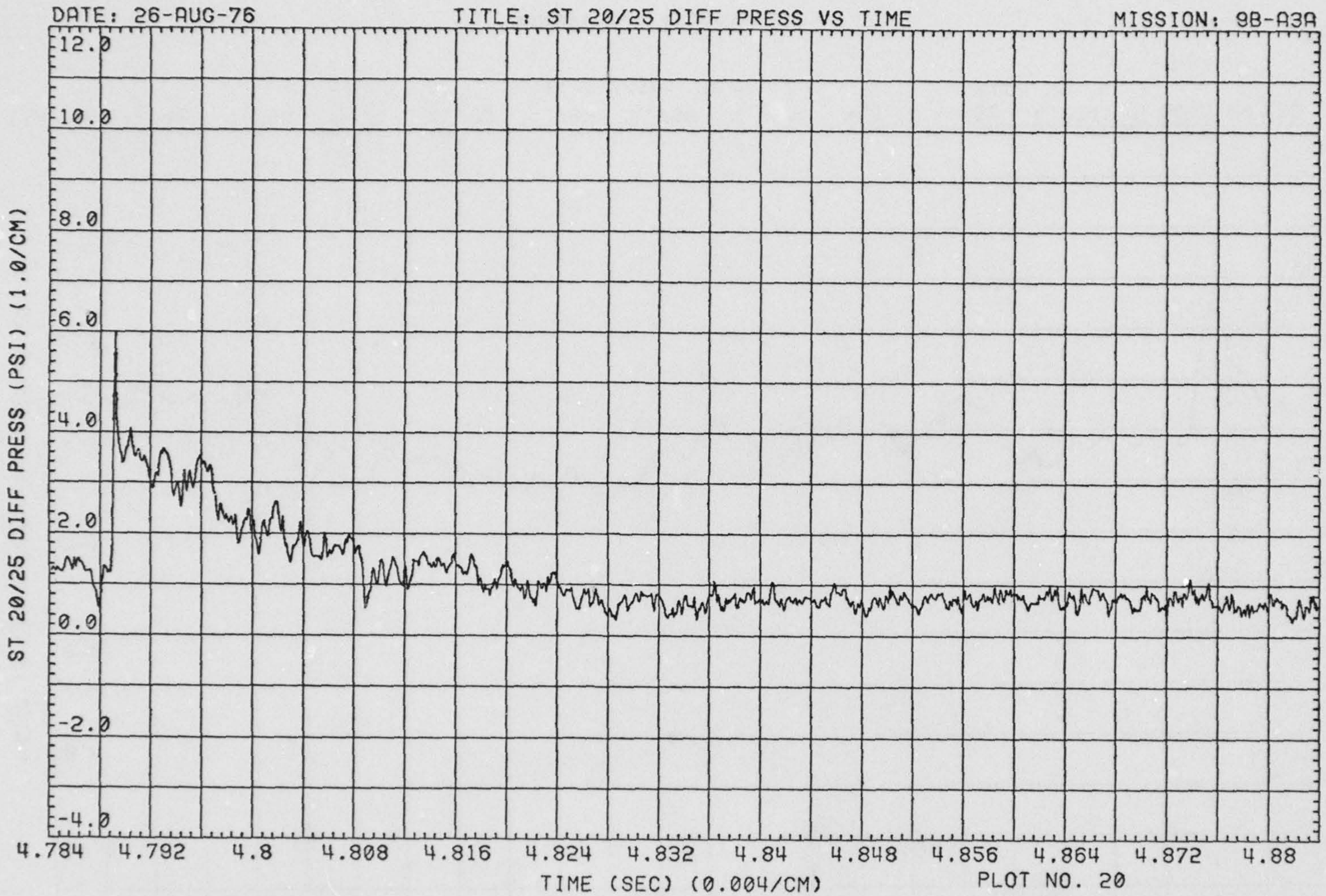


Figure 6. (Continued)

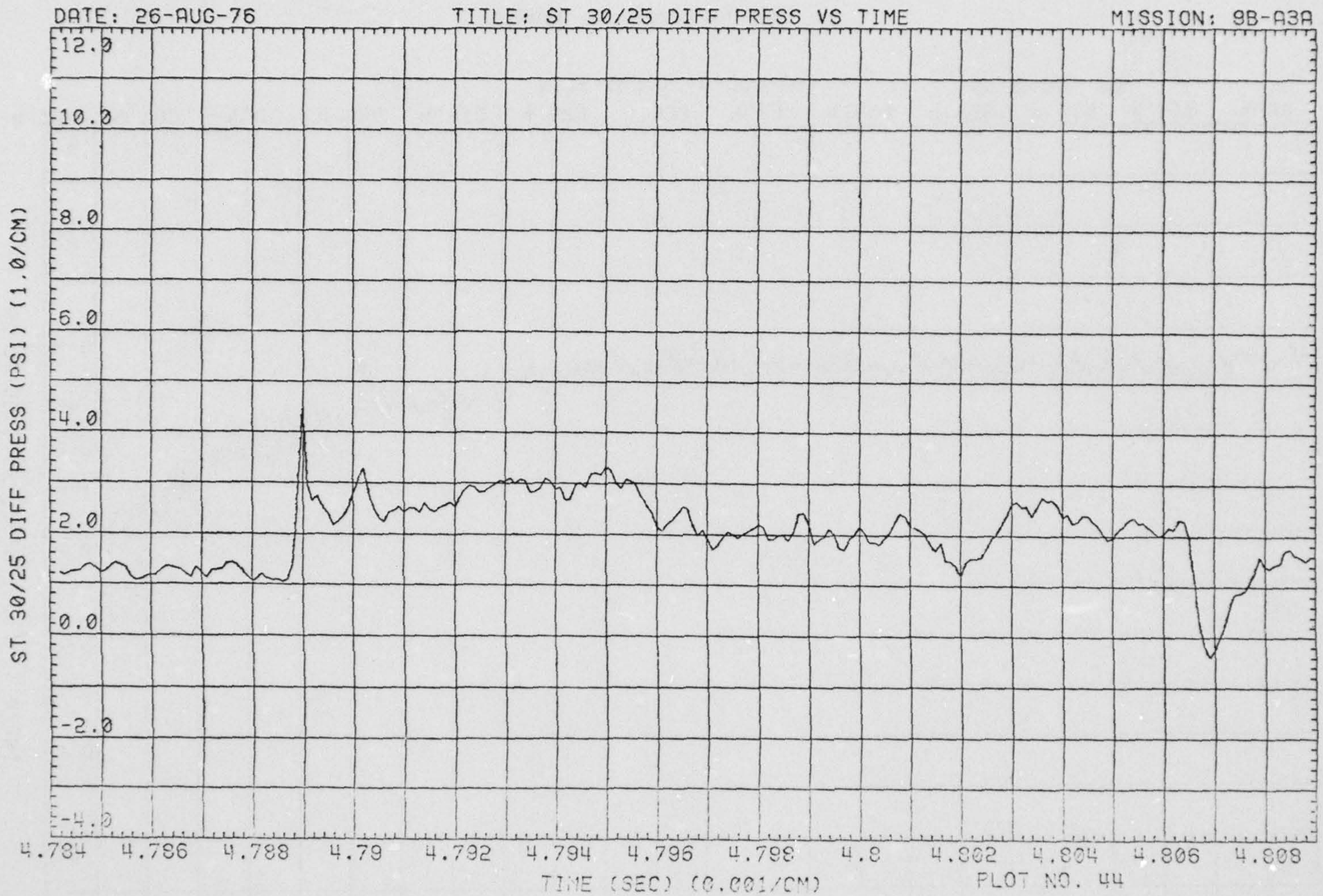


Figure 6. (Continued)

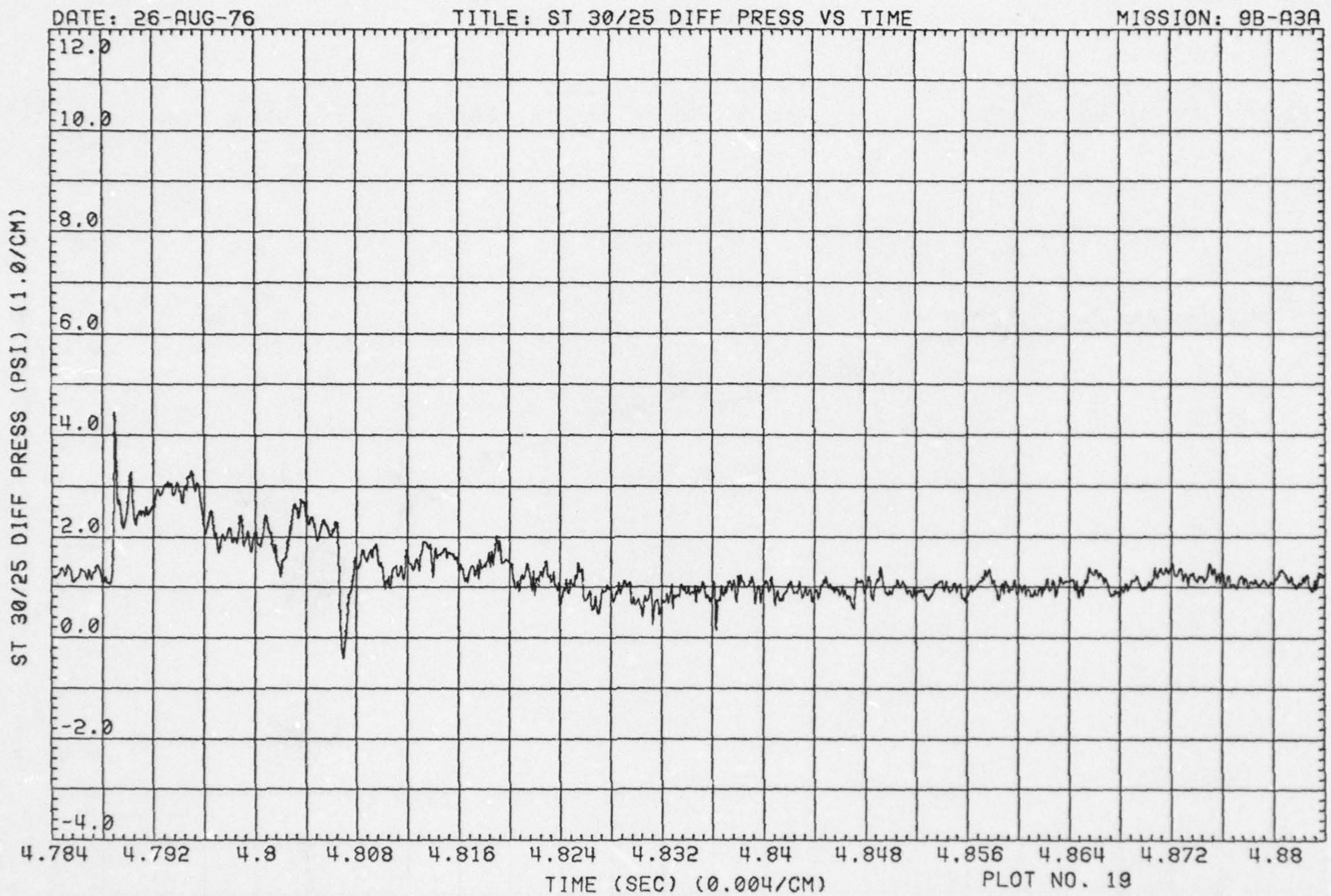


Figure 6. (Continued)

Figure 6. (Continued)

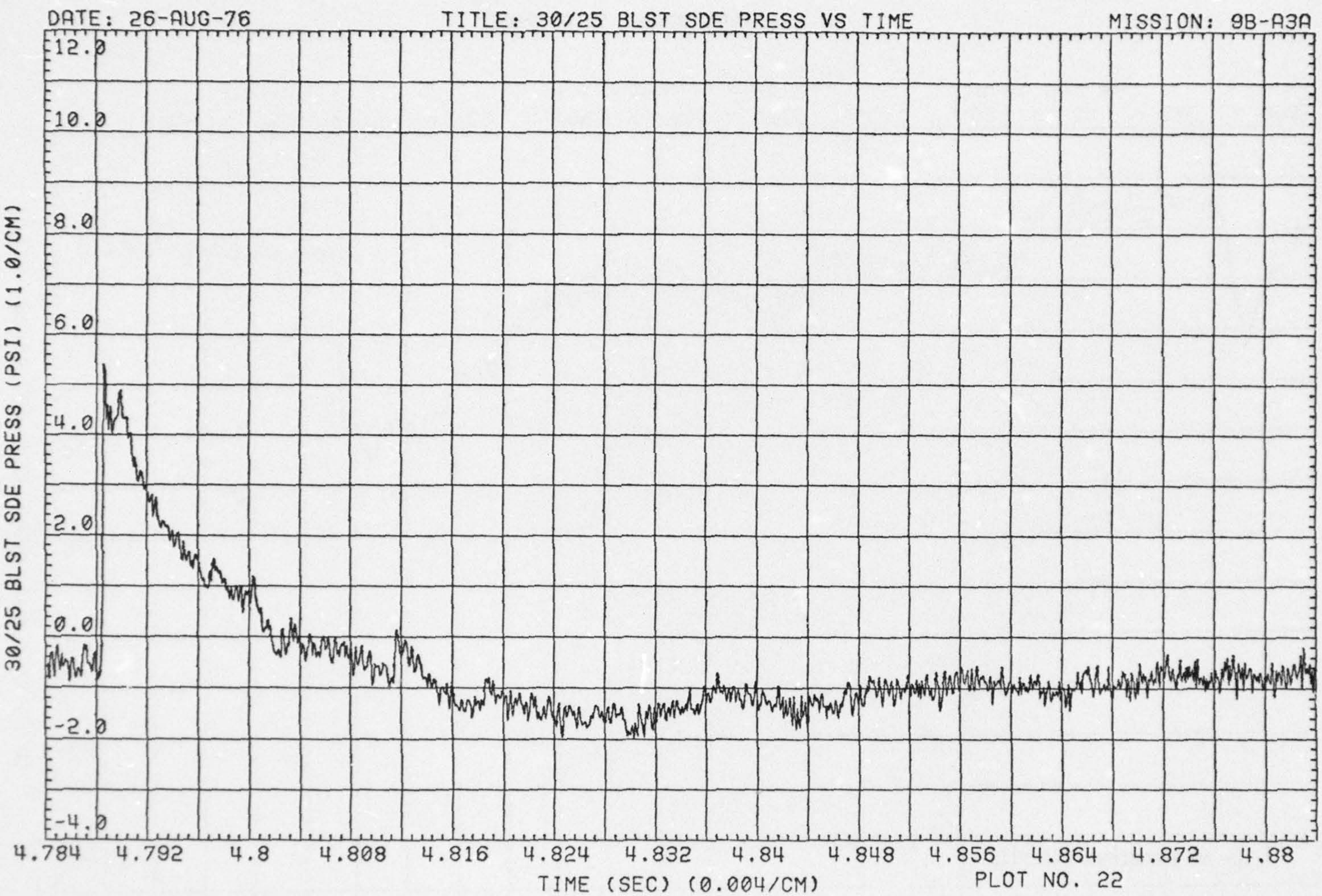


Figure 6. (Continued)

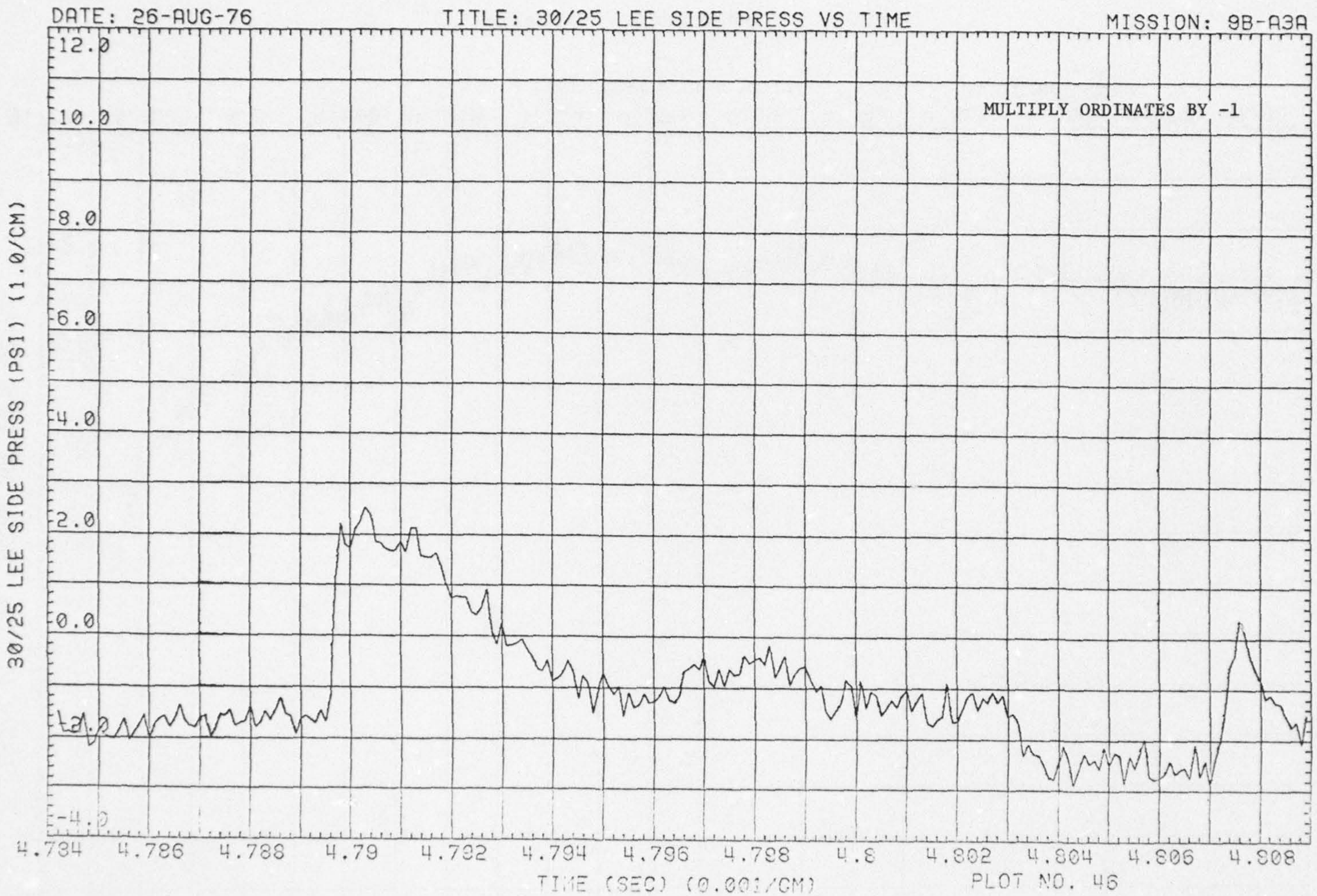


Figure 6. (Continued)

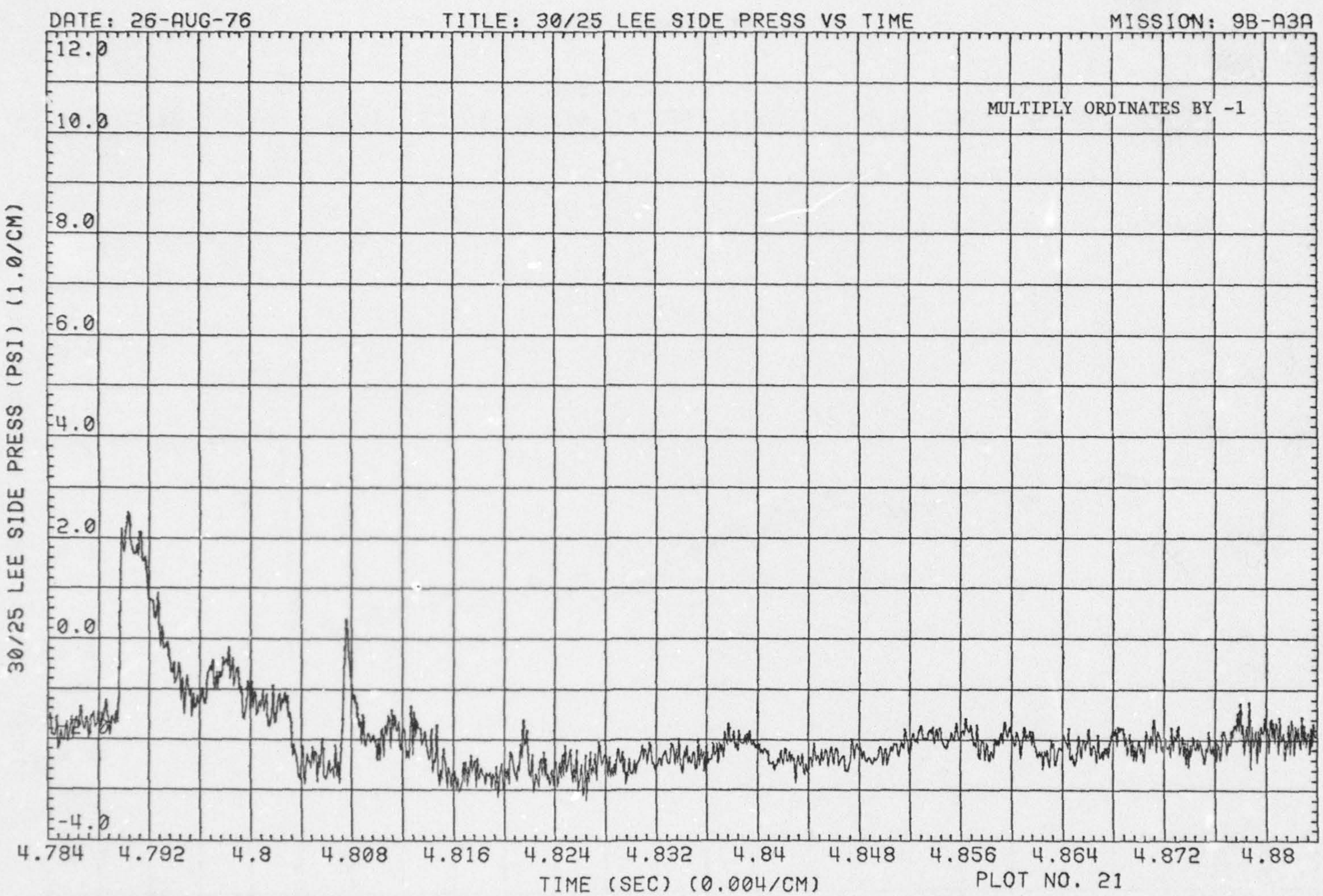


Figure 6. (Continued)

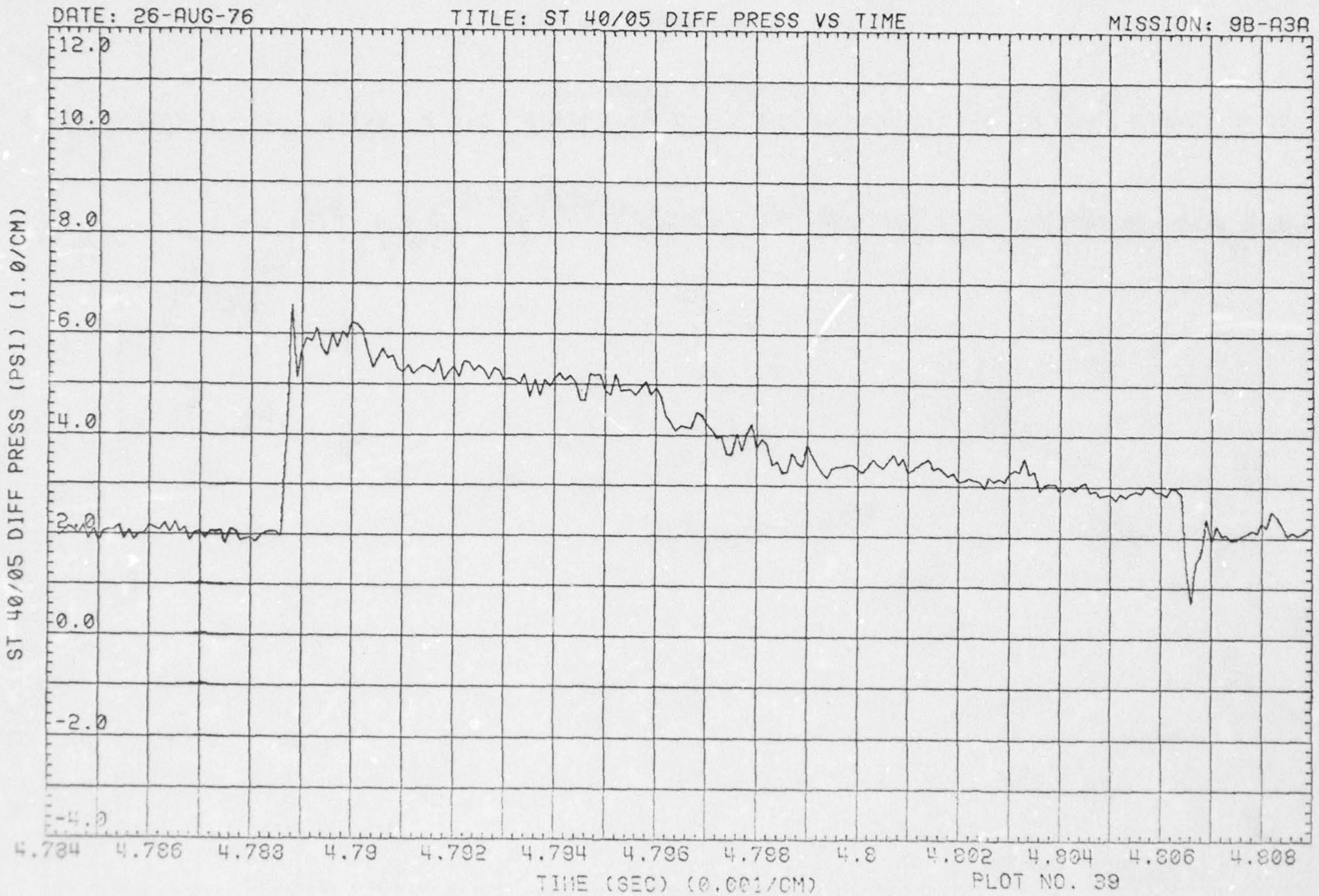
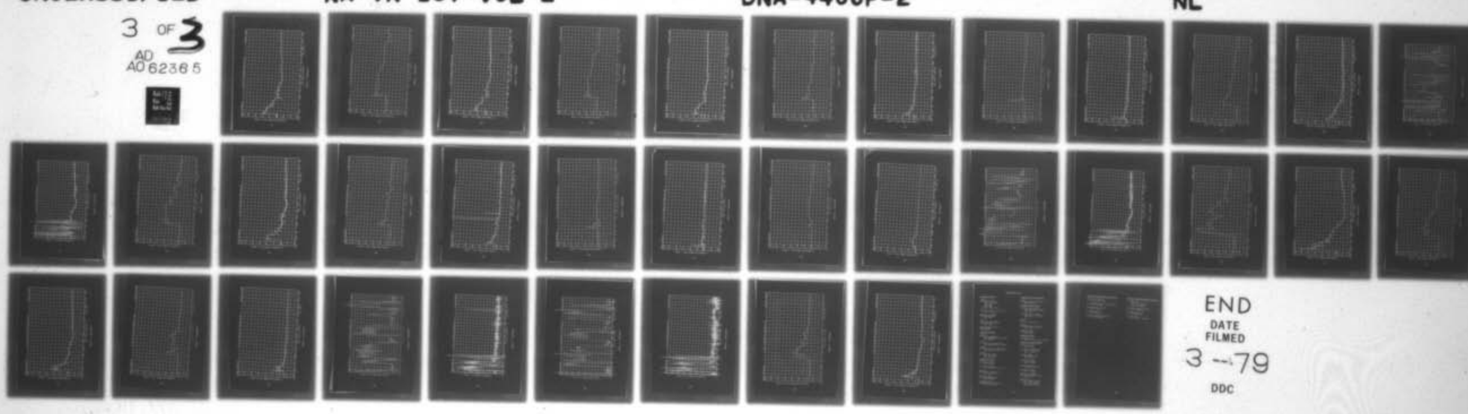


Figure 6. (Continued)

AD-A062 365 KAMAN AVIDYNE BURLINGTON MASS F/G 19/4
MEASUREMENTS OF BLAST PRESSURES ON A RIGID 65 DEGREE SWEPTBACK --ETC(U)
JUN 77 J R RUETENIK, R F SMILEY DNA001-76-C-0106
UNCLASSIFIED KA-TR-137-VOL-2 DNA-4400F-2 NL

3 OF 3
AD
A062365



END
DATE
FILMED
3-79
DDC

IFIED

3 OF 3

AD A062365

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

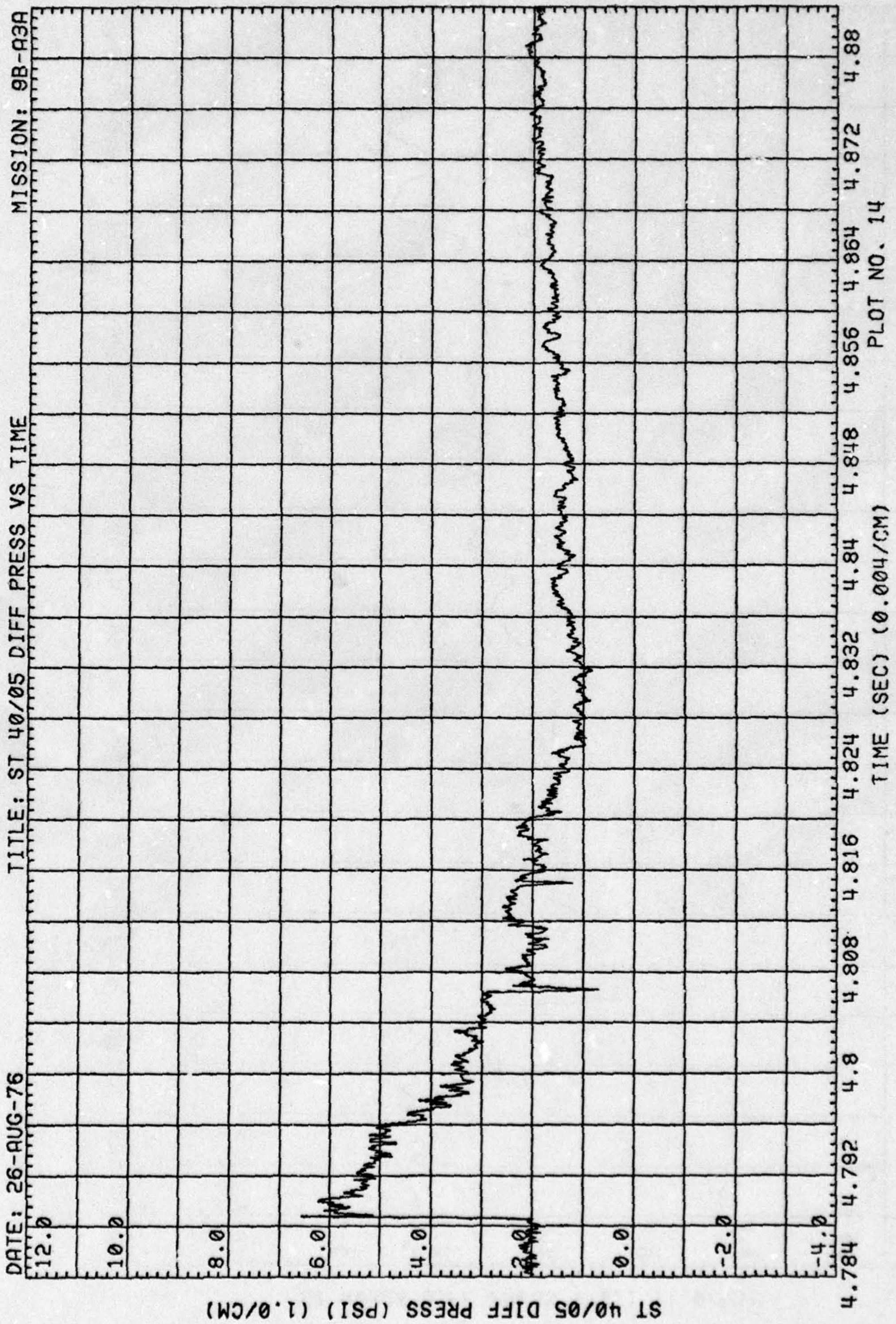


Figure 6. (Continued)

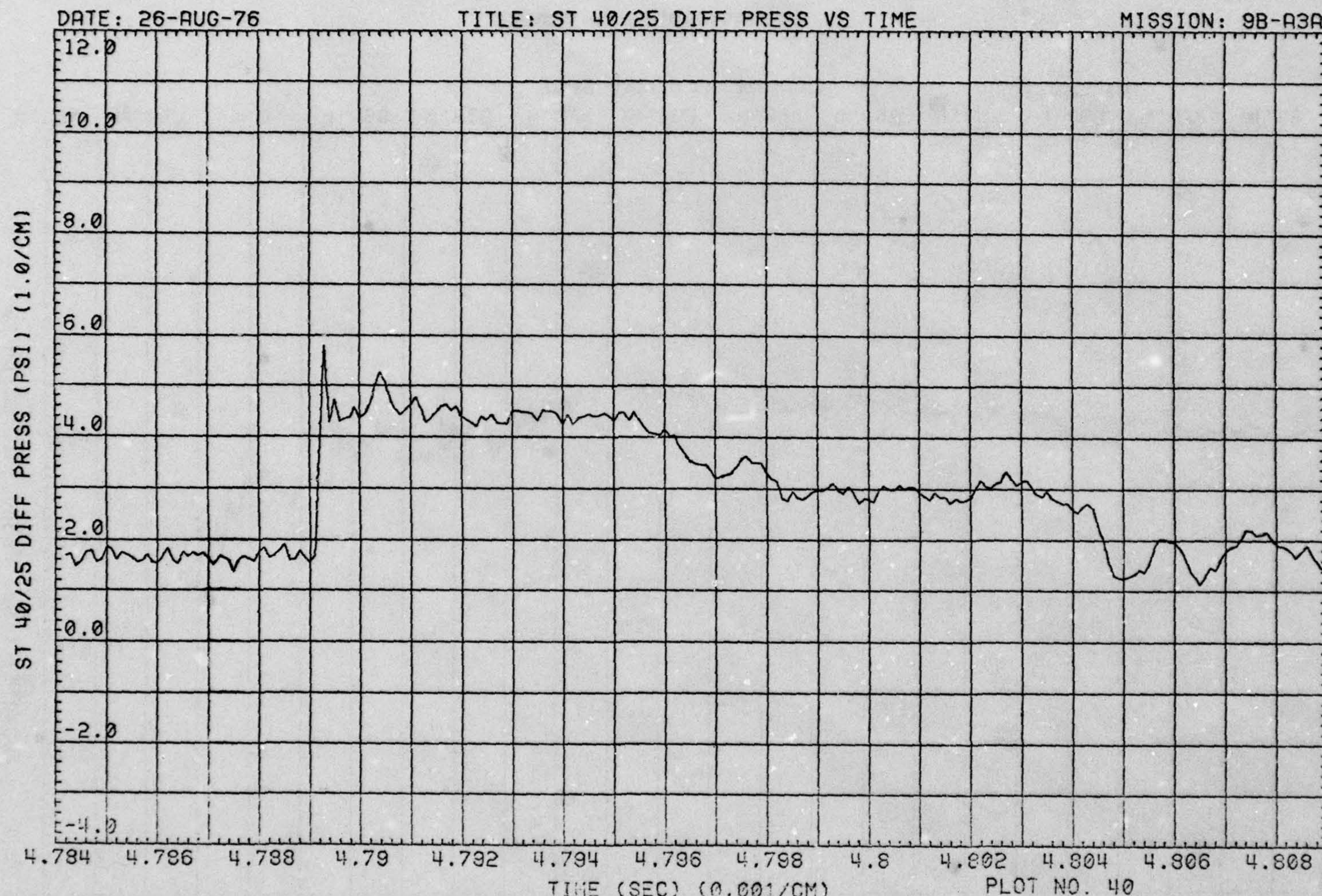


Figure 6. (Continued)

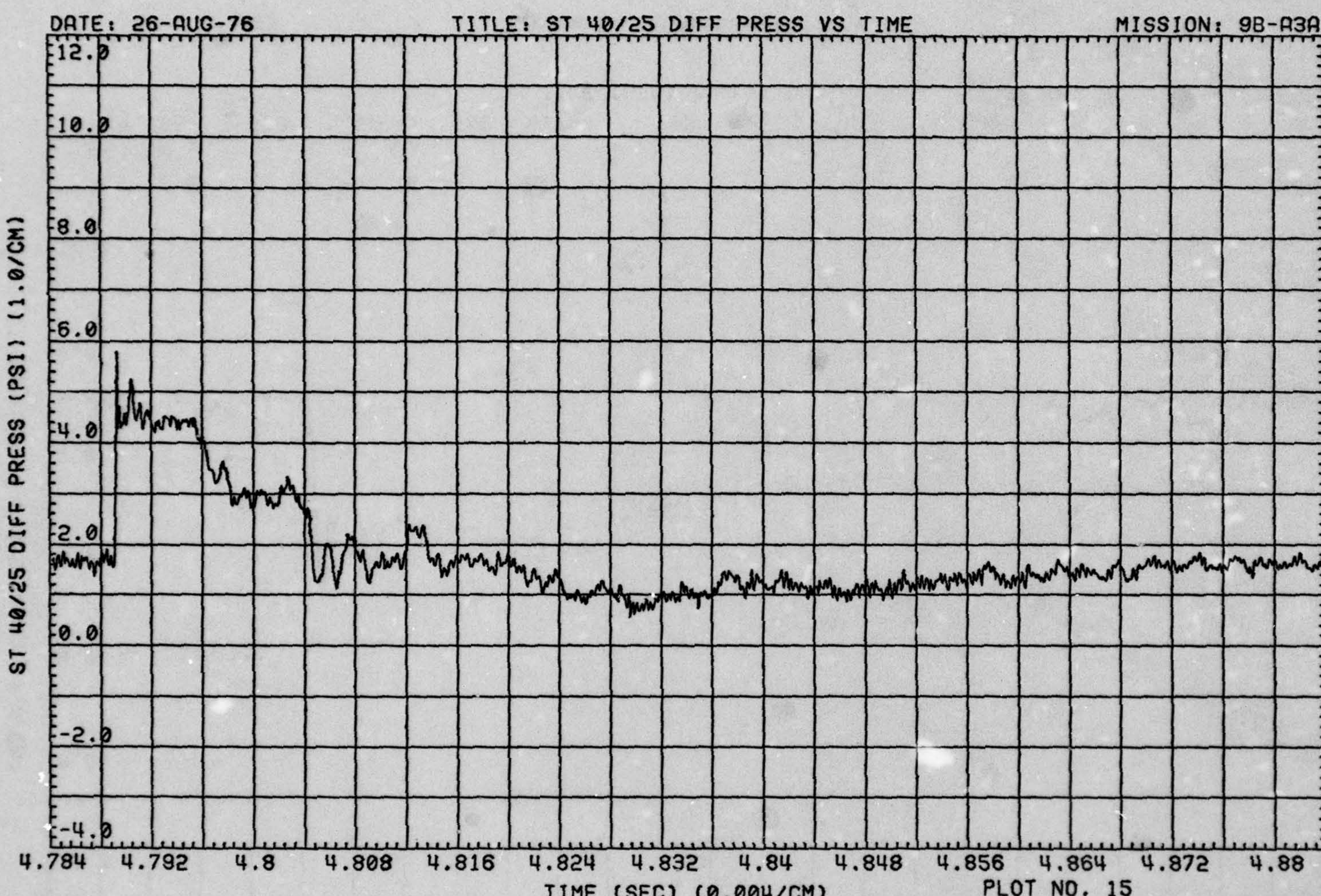


Figure 6. (Continued)

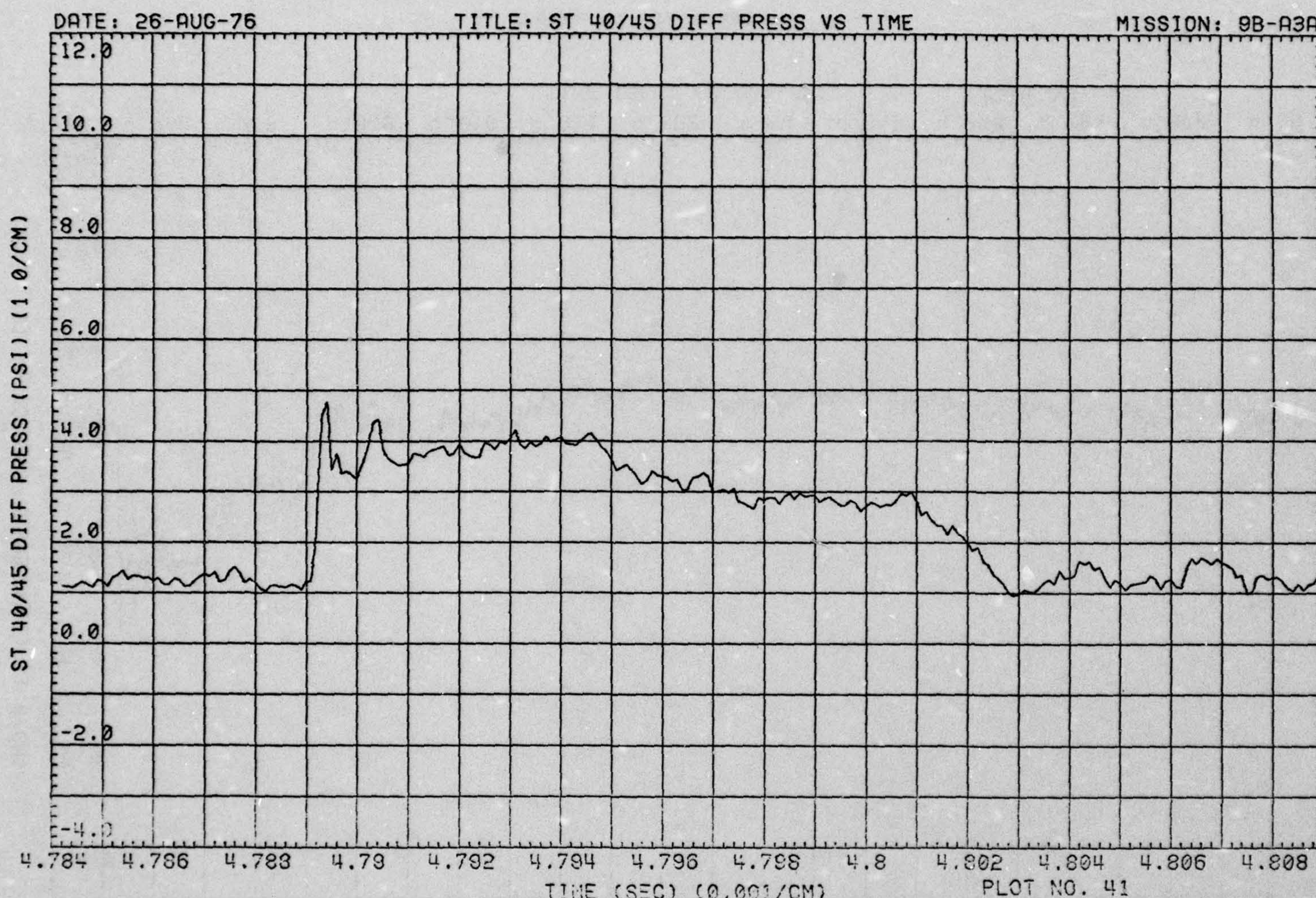


Figure 6. (Continued)

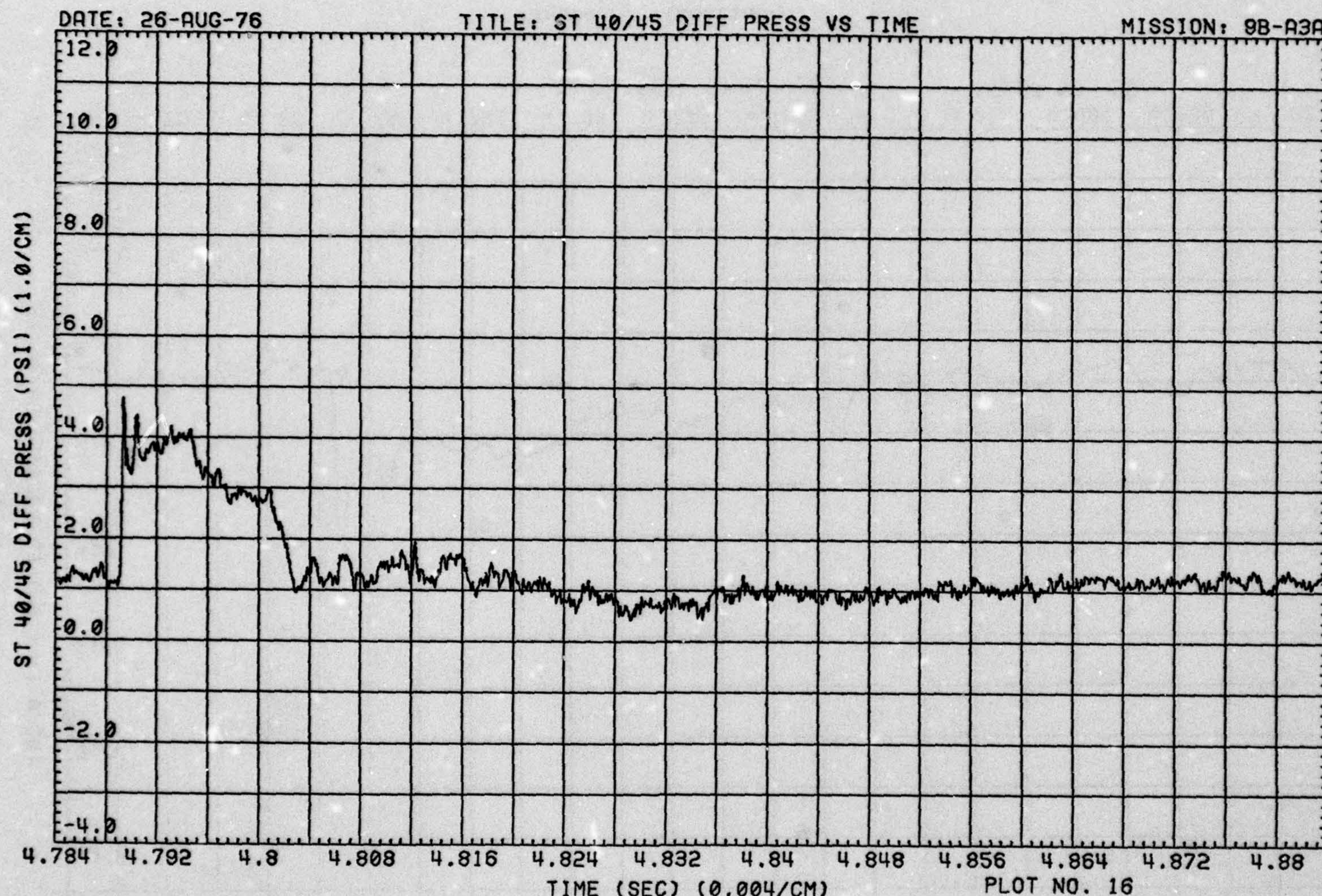


Figure 6. (Continued)

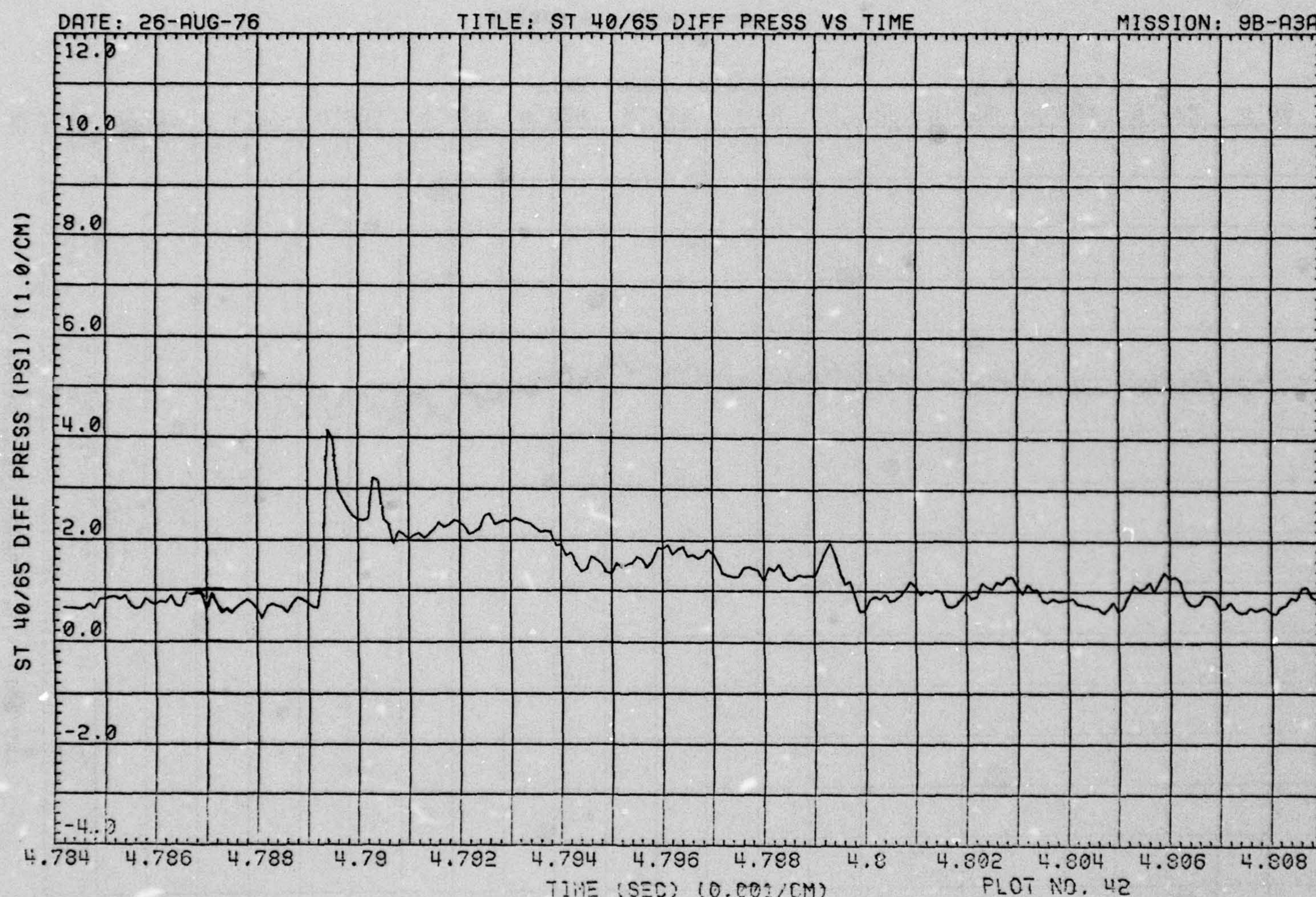


Figure 6. (Continued)

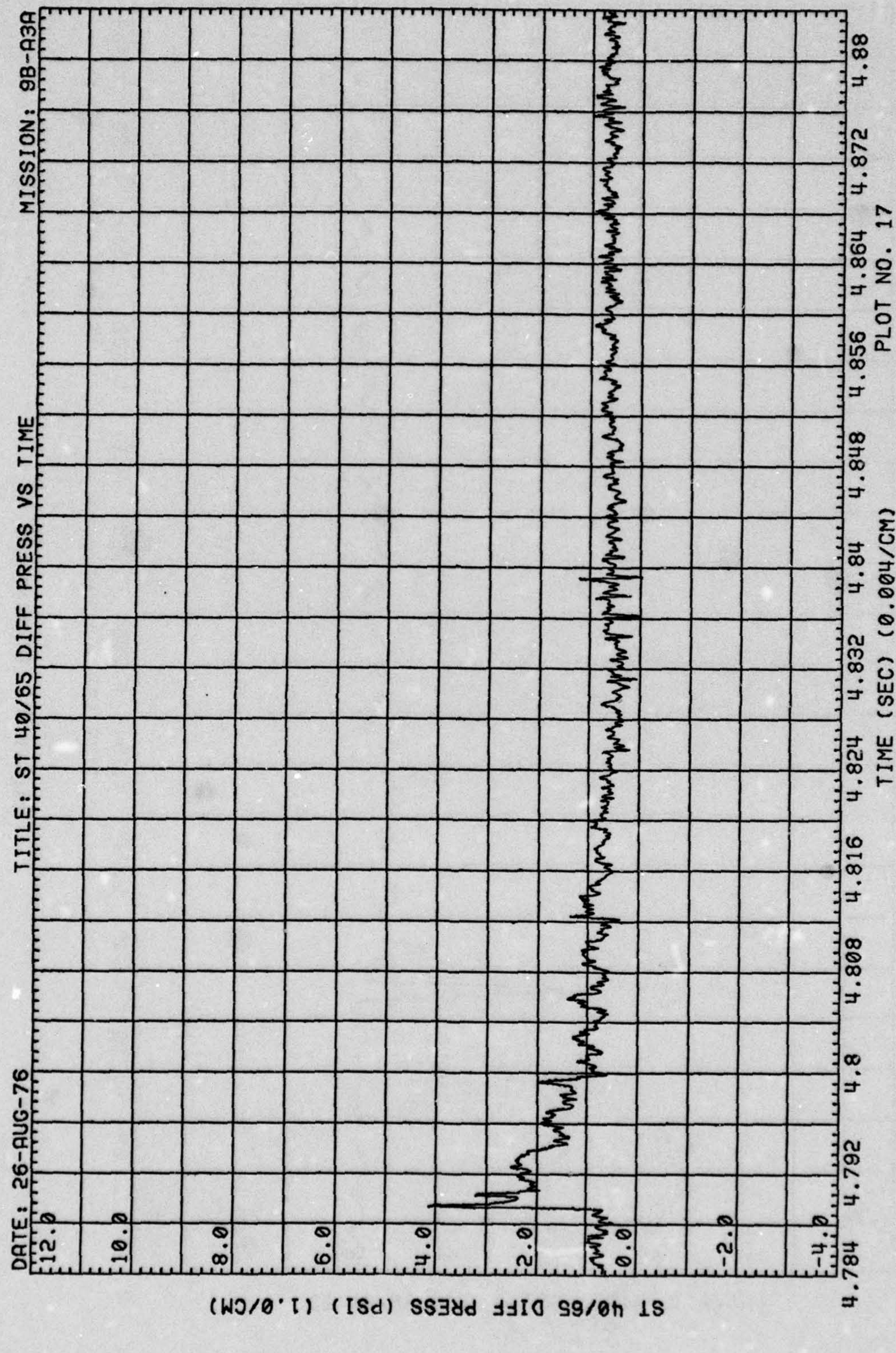


Figure 6. (Continued)

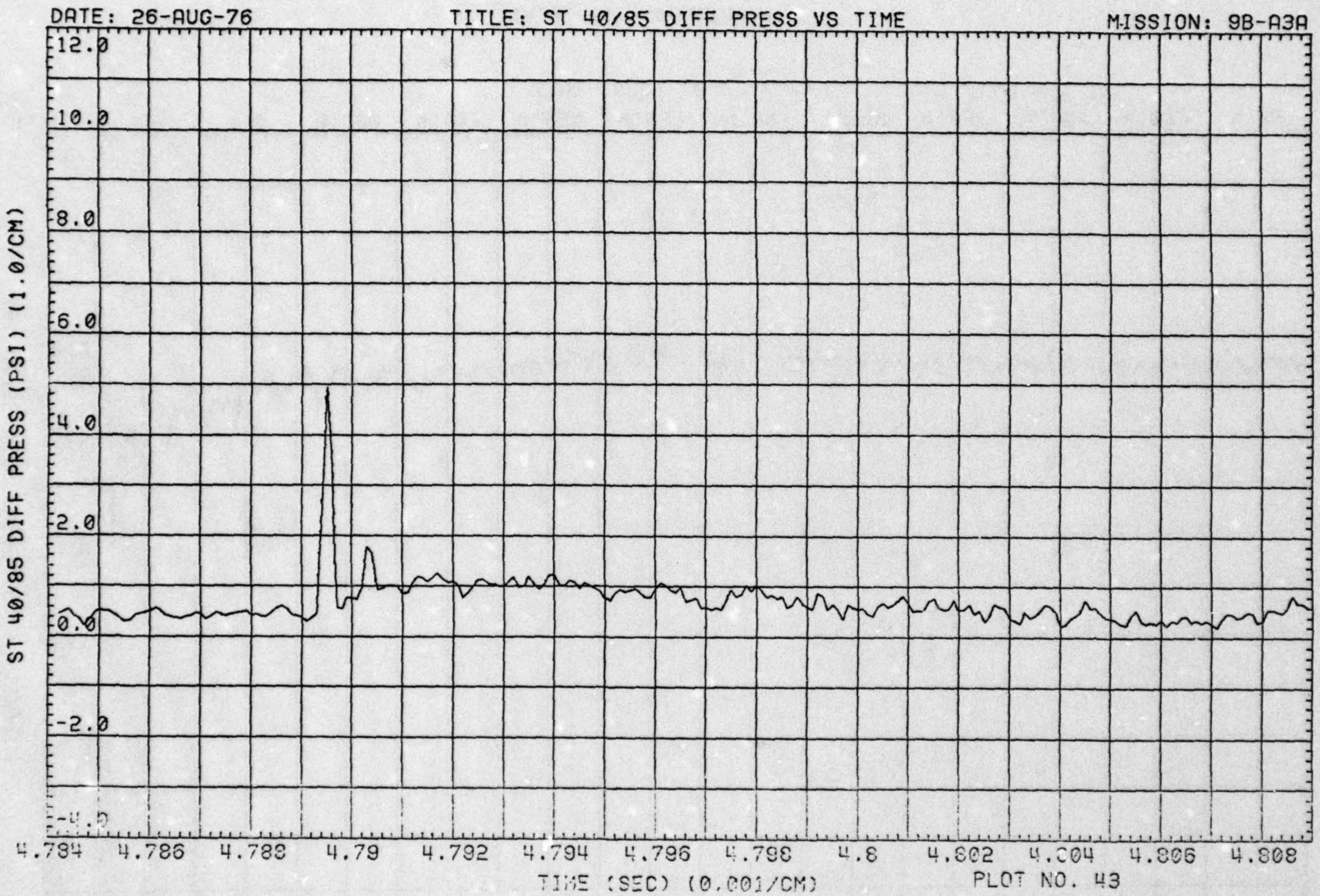


Figure 6. (Continued)

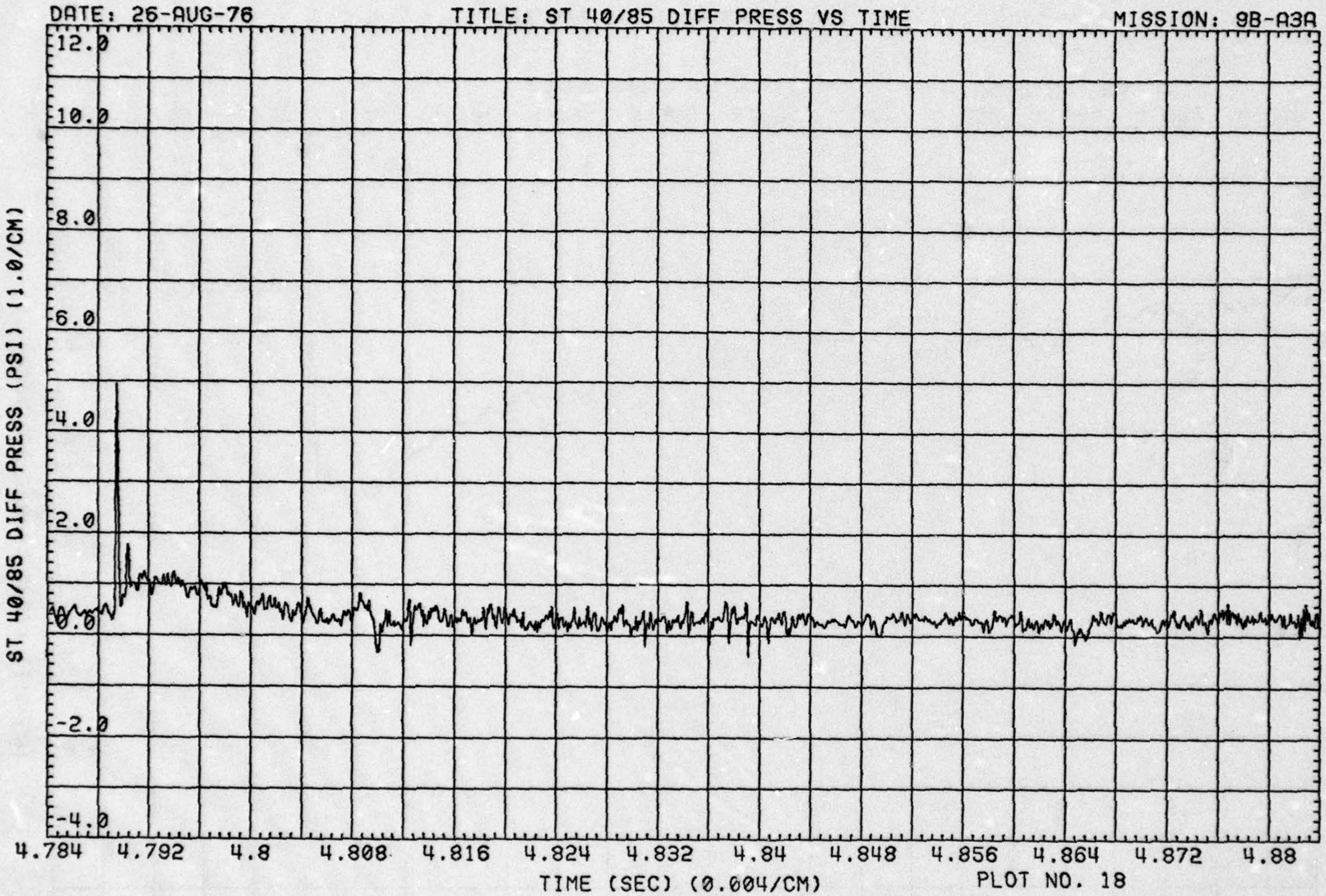


Figure 6. (Continued)

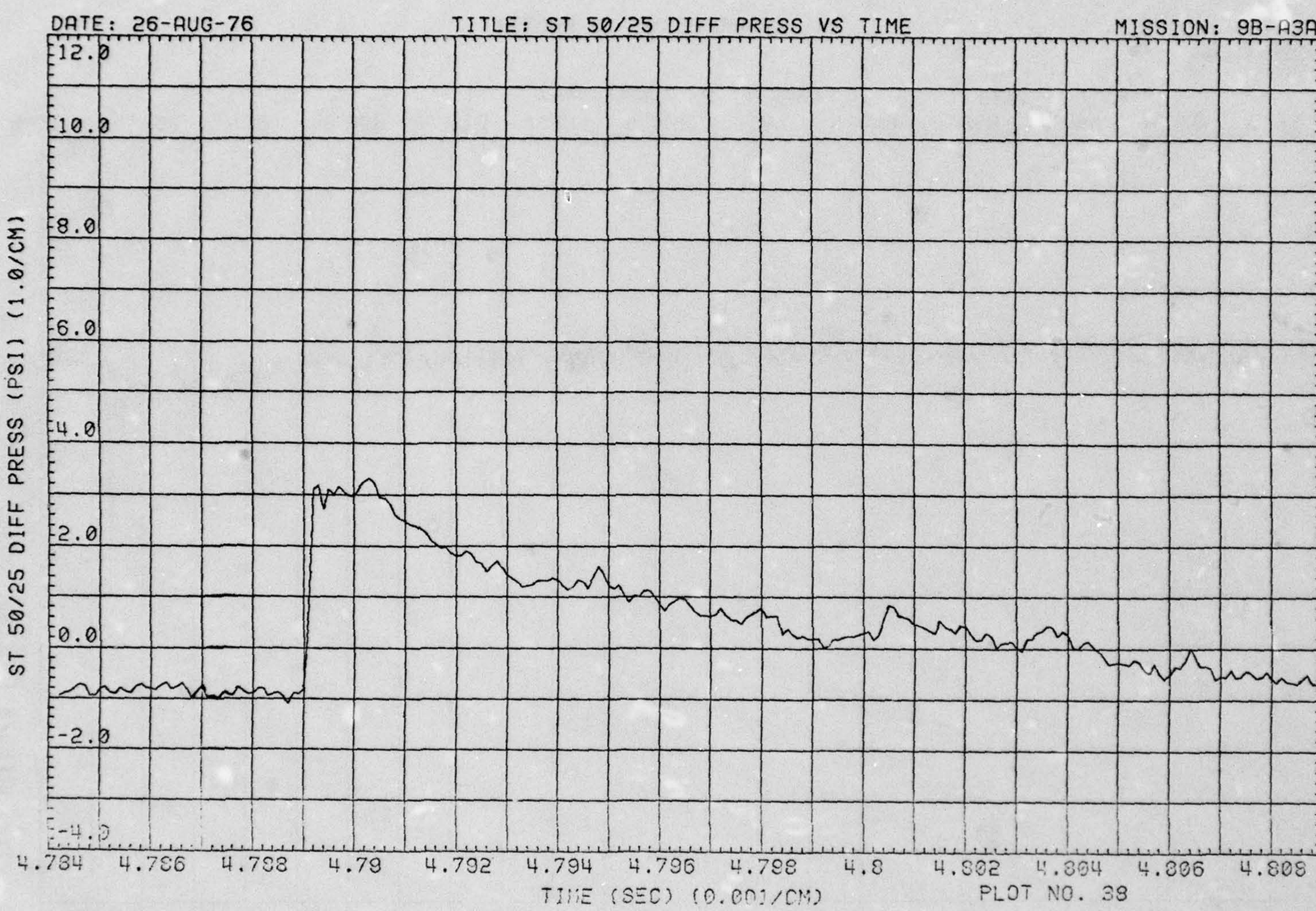


Figure 6. (Continued)

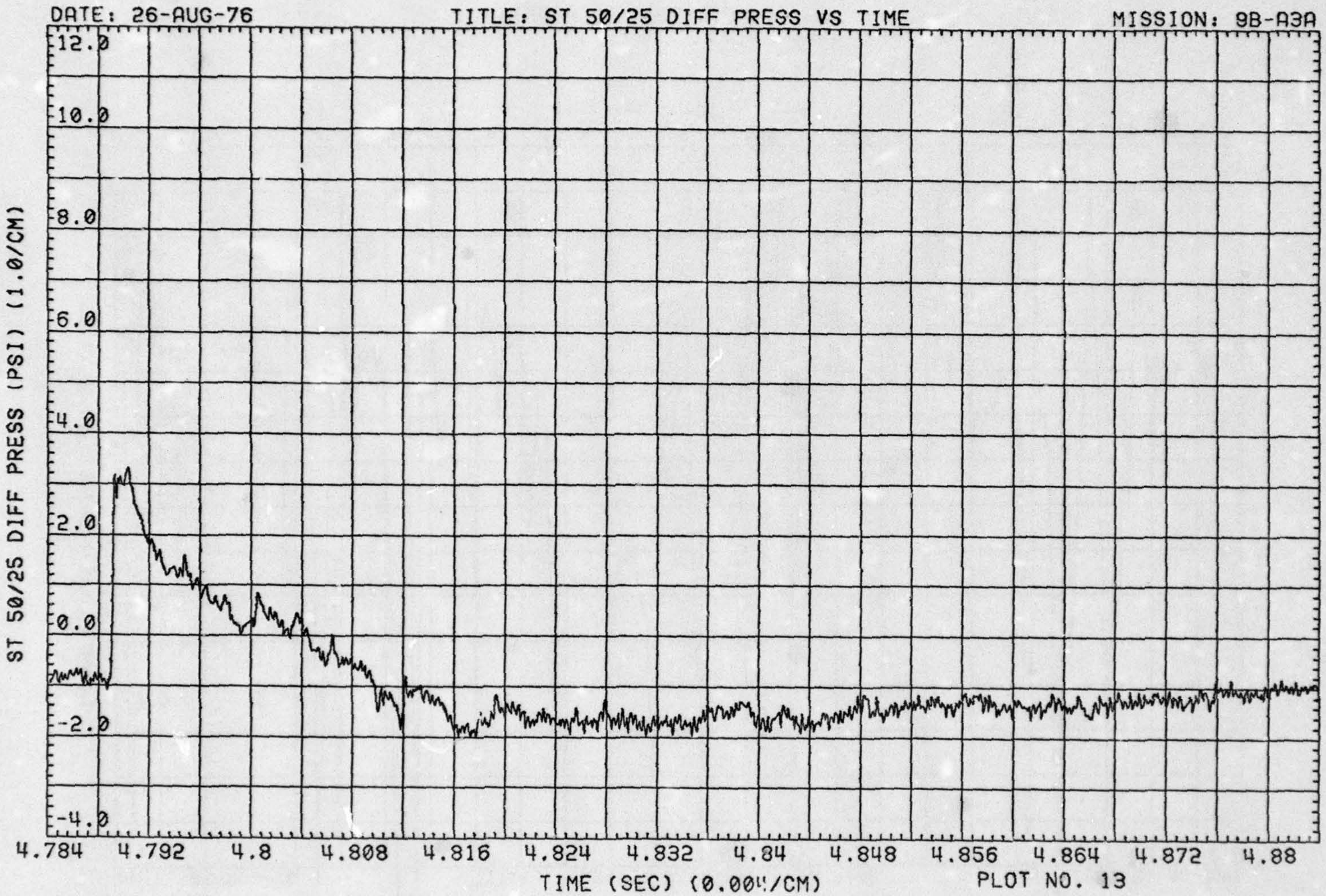


Figure 6. (Continued)

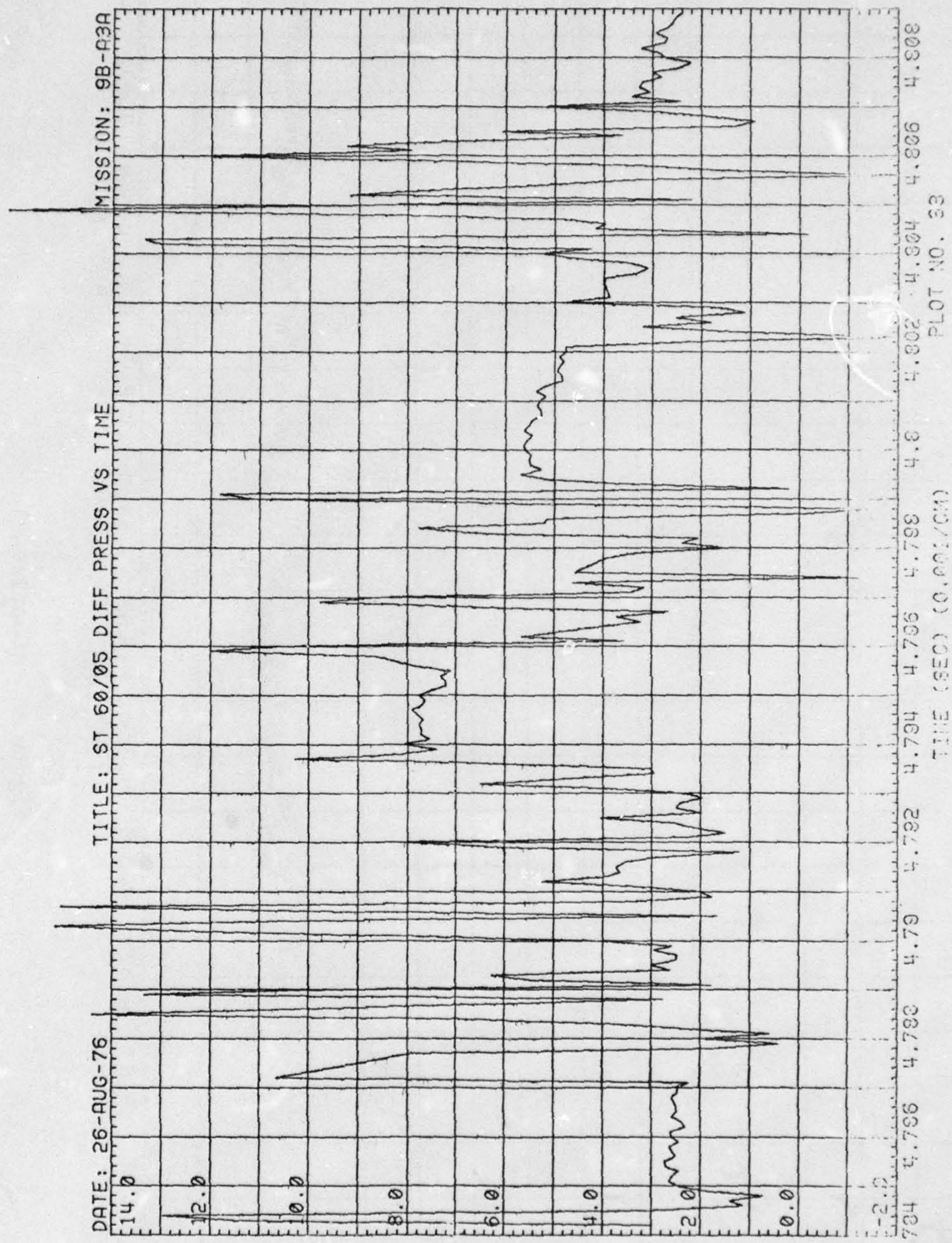


Figure 6. (Continued)

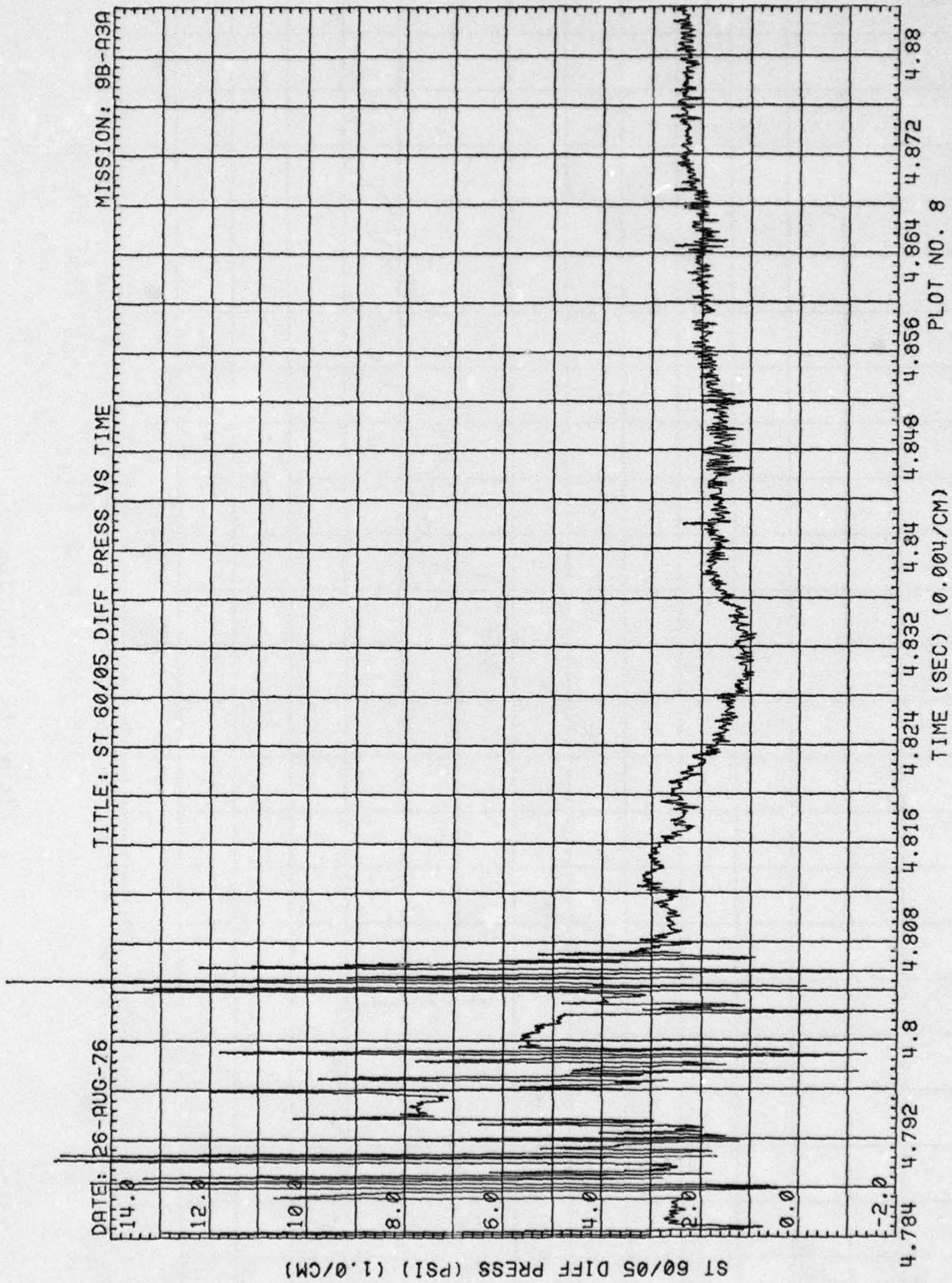


Figure 6. (Continued)

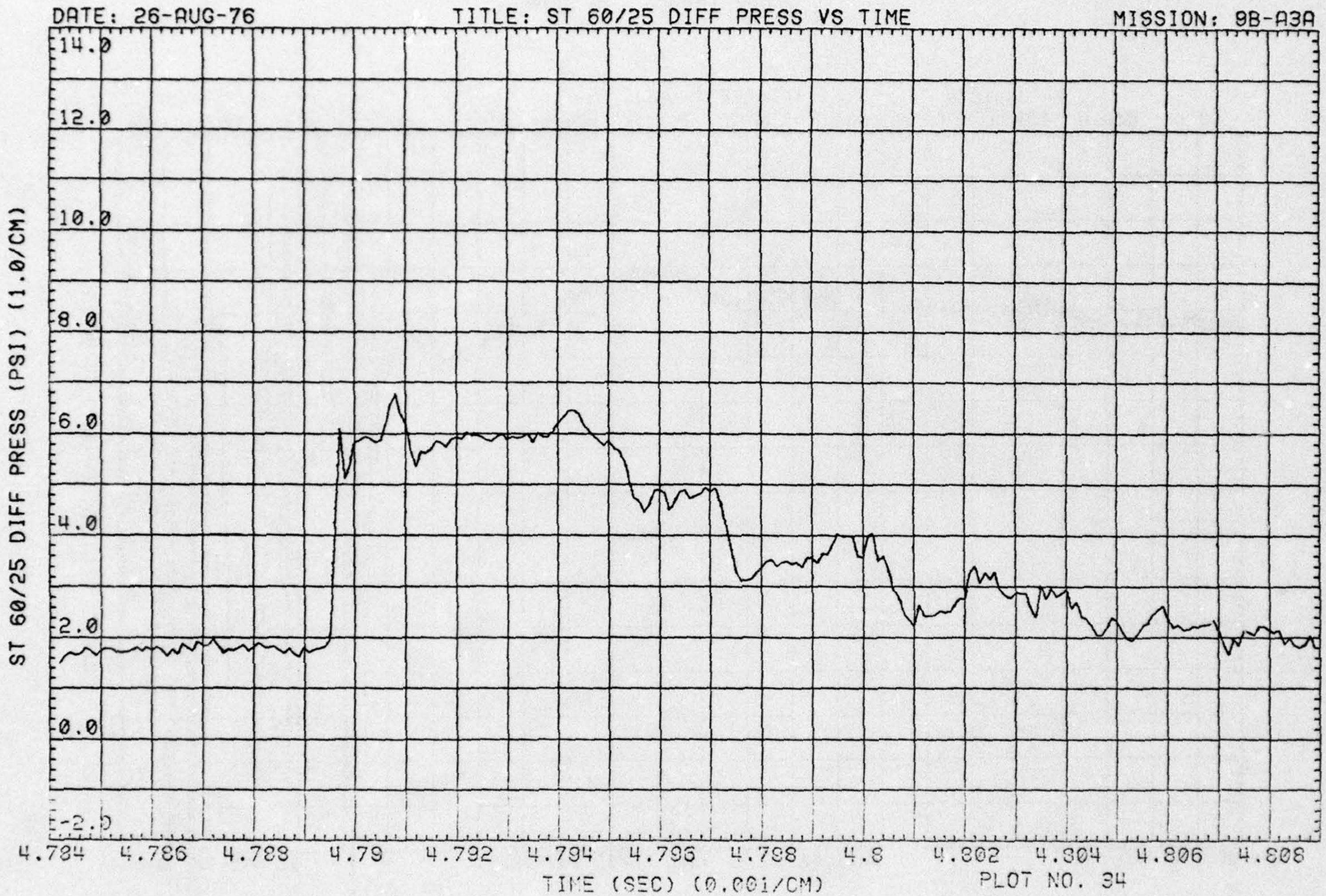


Figure 6. (Continued)

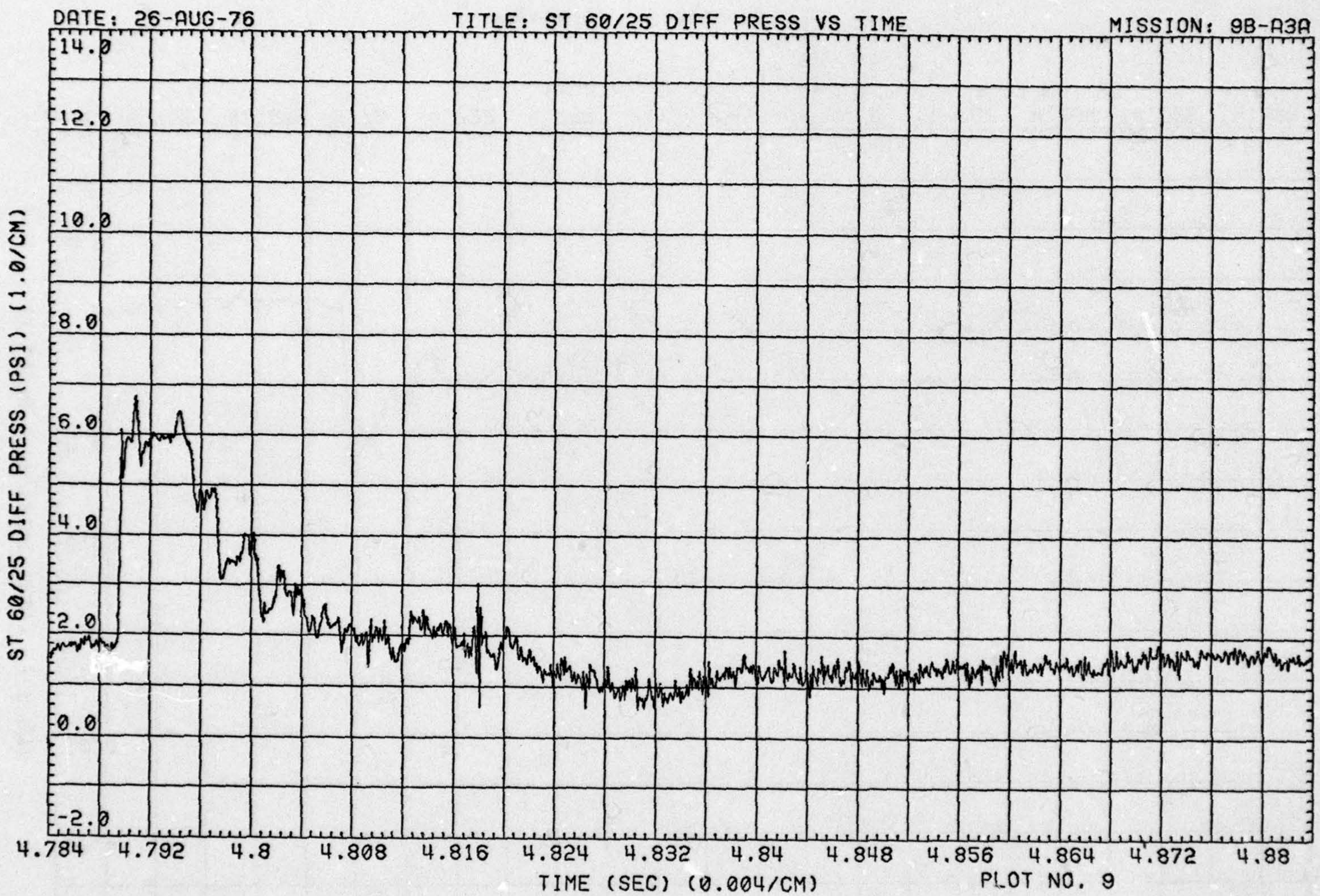


Figure 6. (Continued)

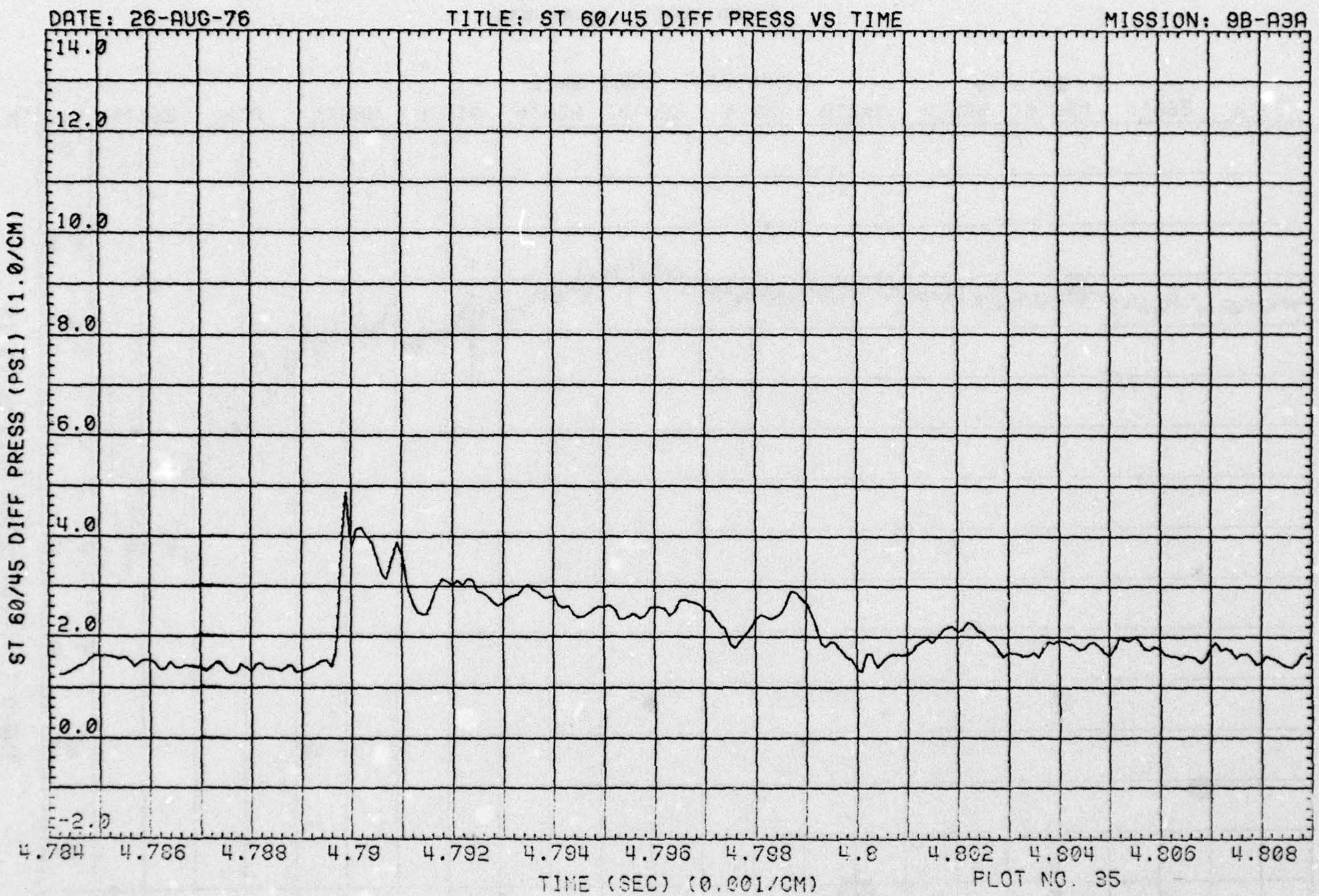


Figure 6. (Continued)

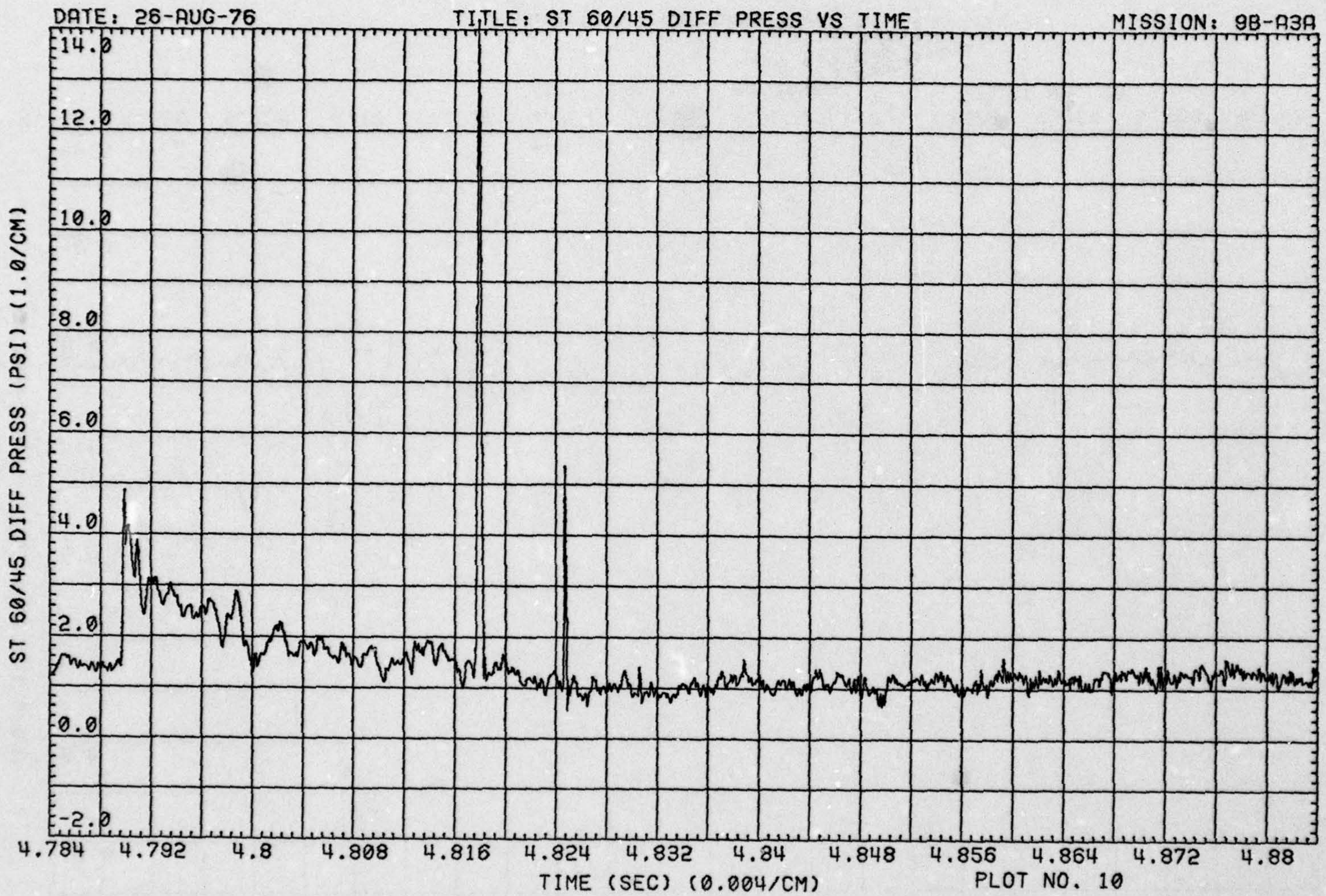


Figure 6. (Continued)

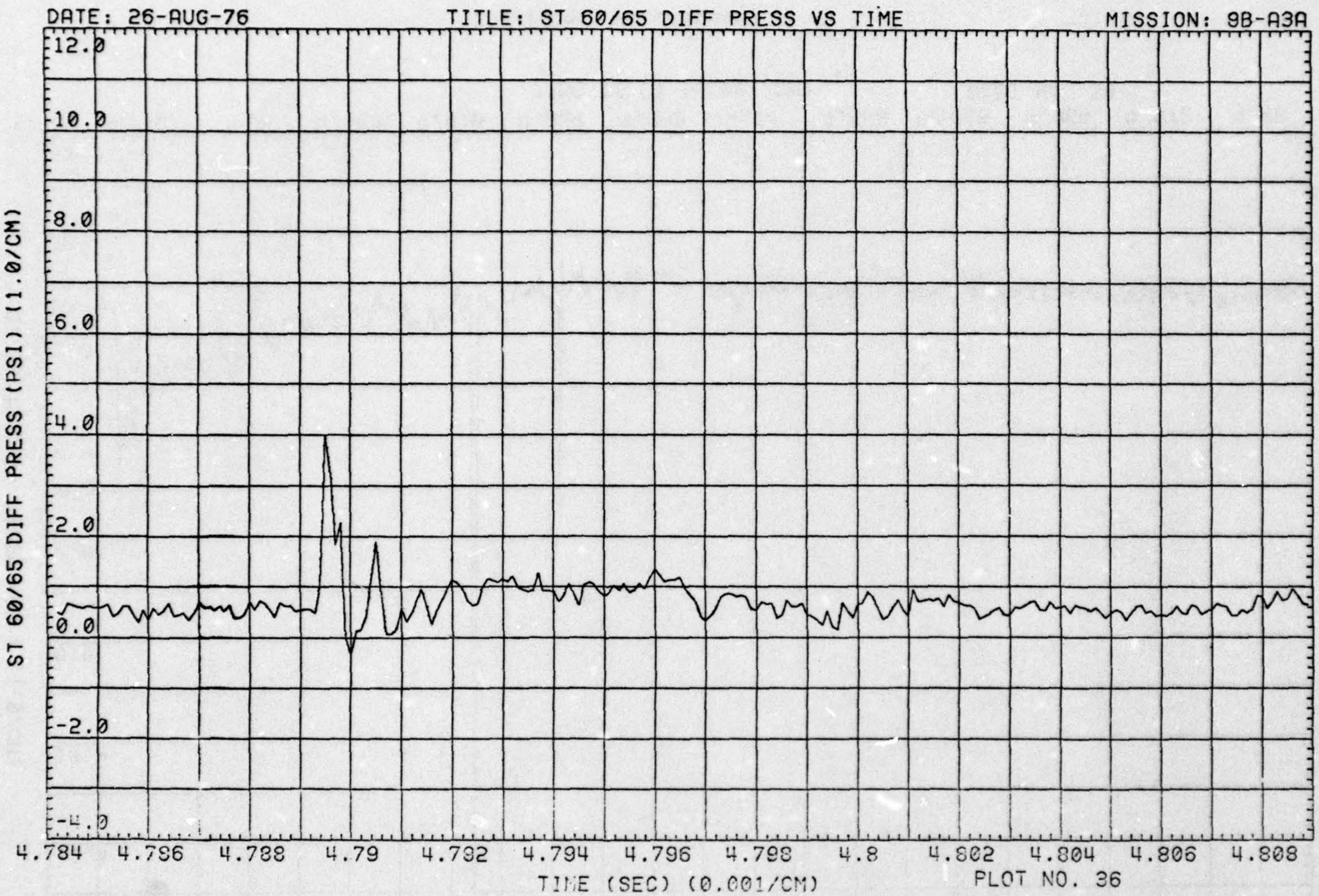


Figure 6. (Continued)

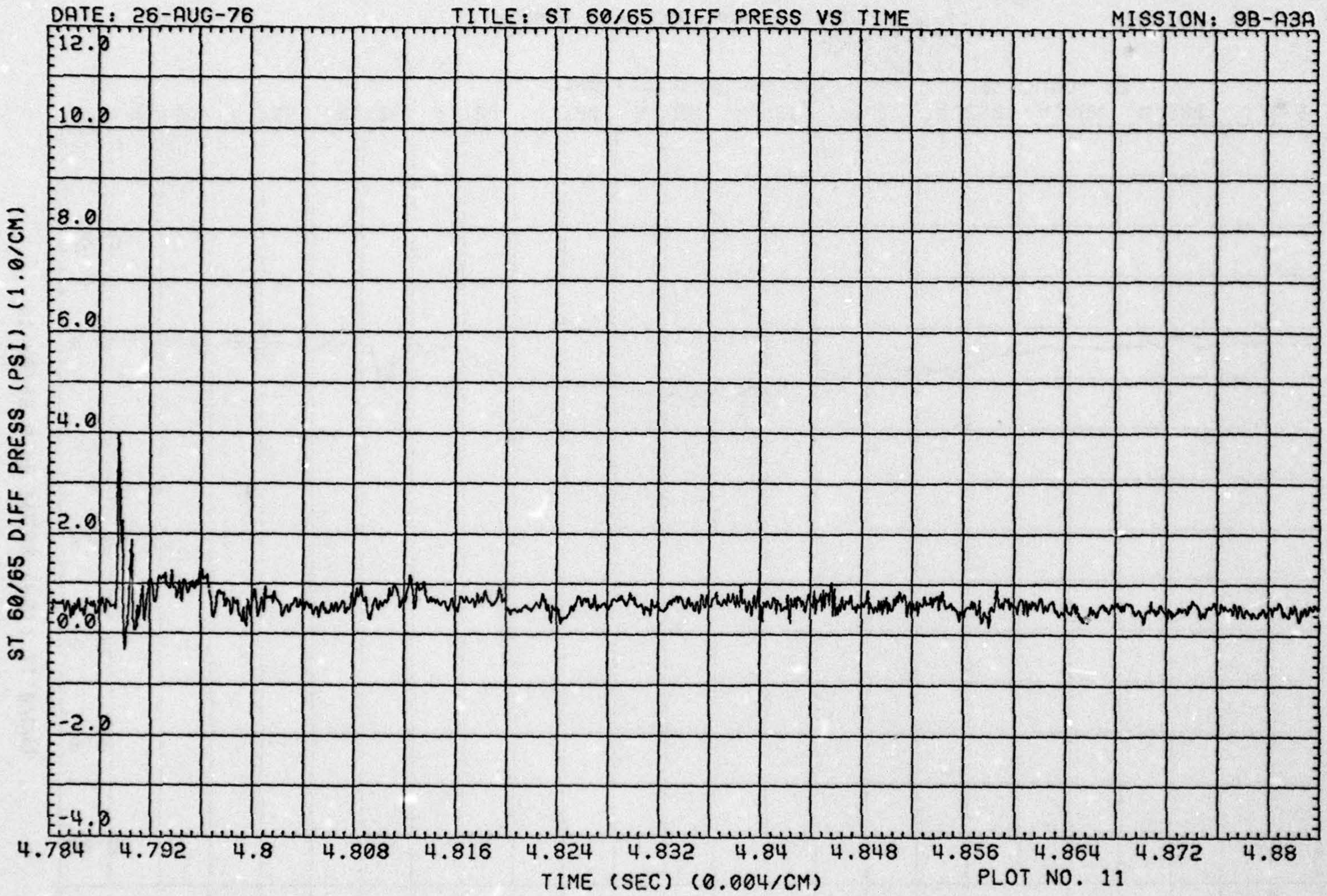


Figure 6. (Continued)

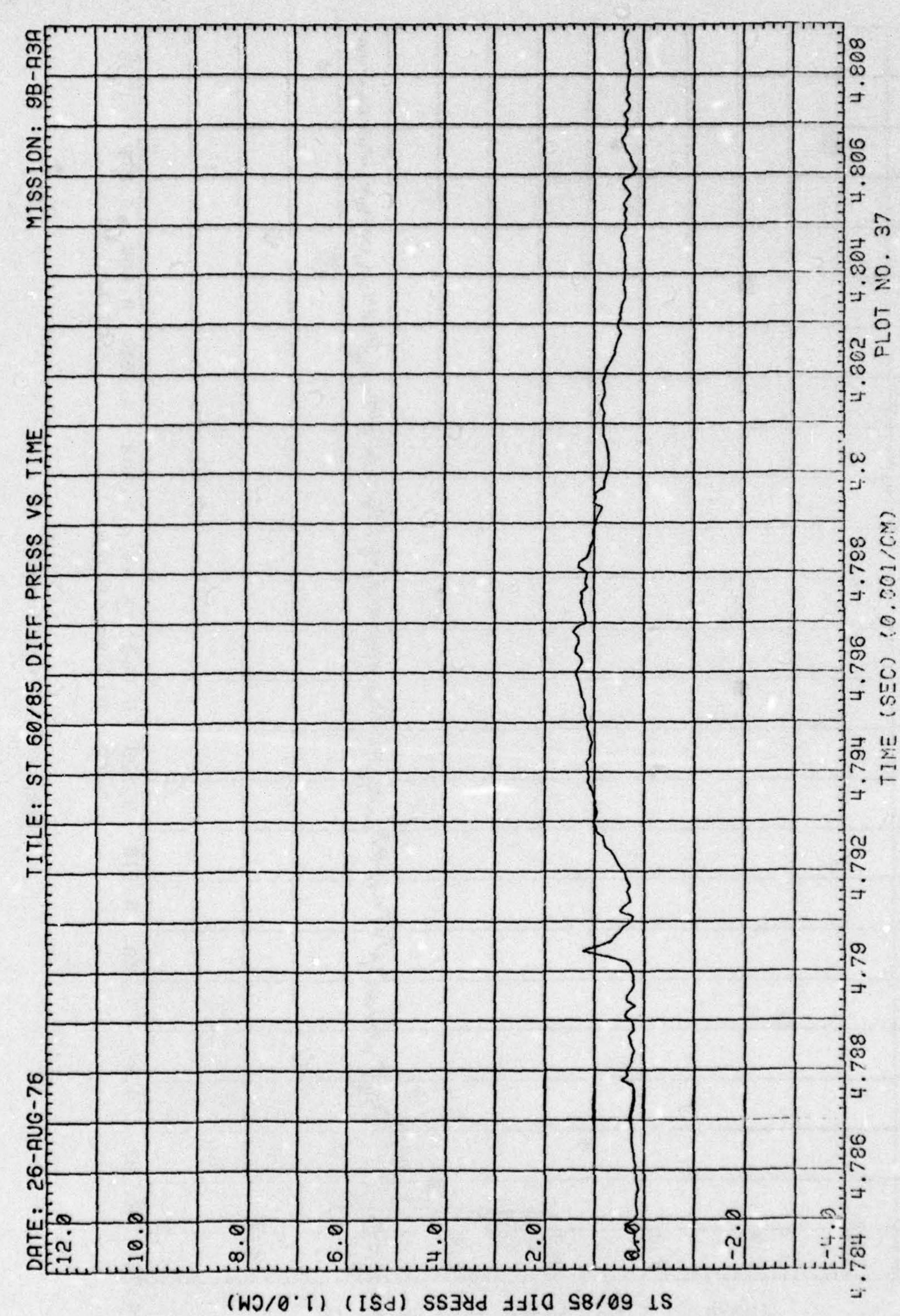


Figure 6. (Continued)

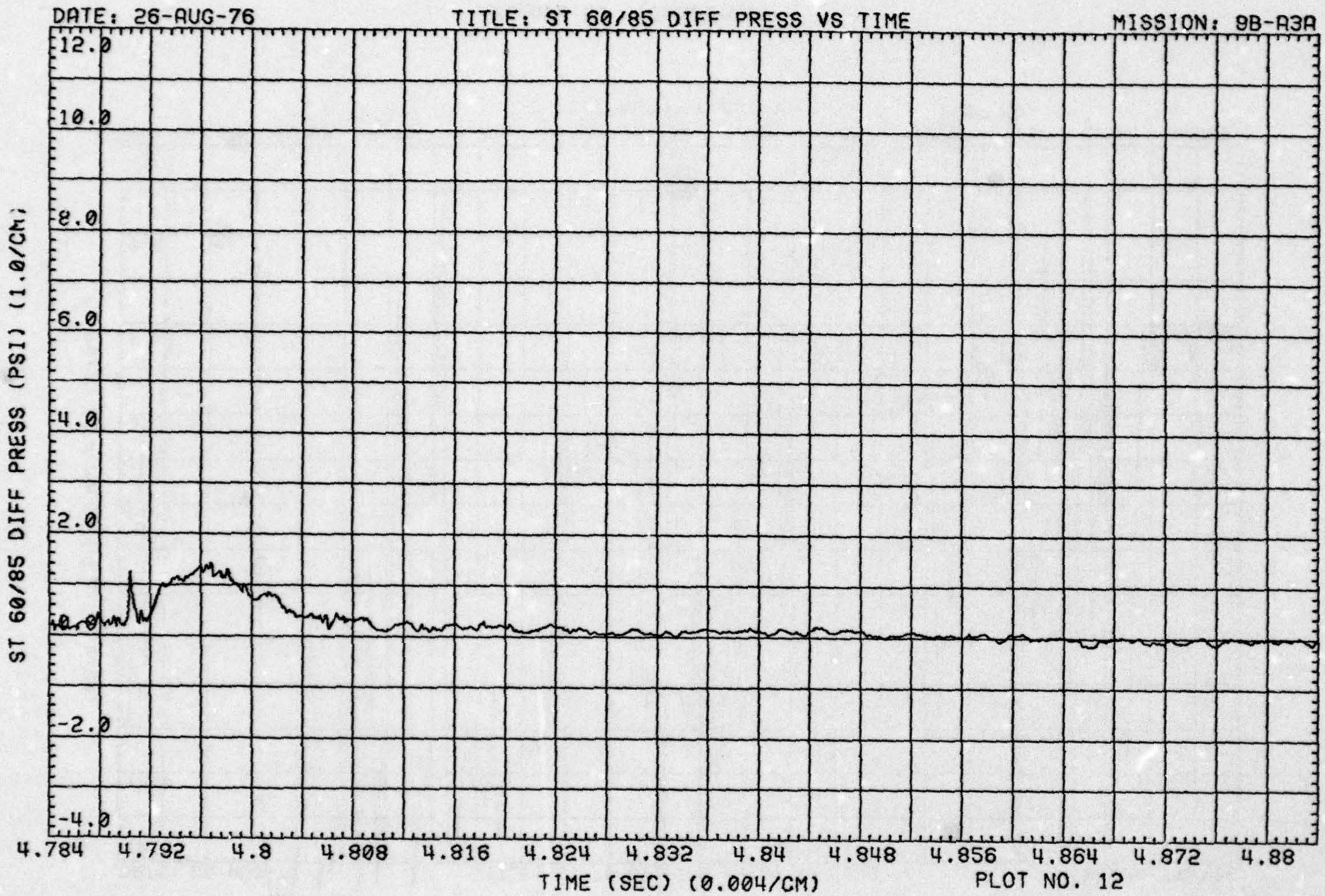


Figure 6. (Continued)

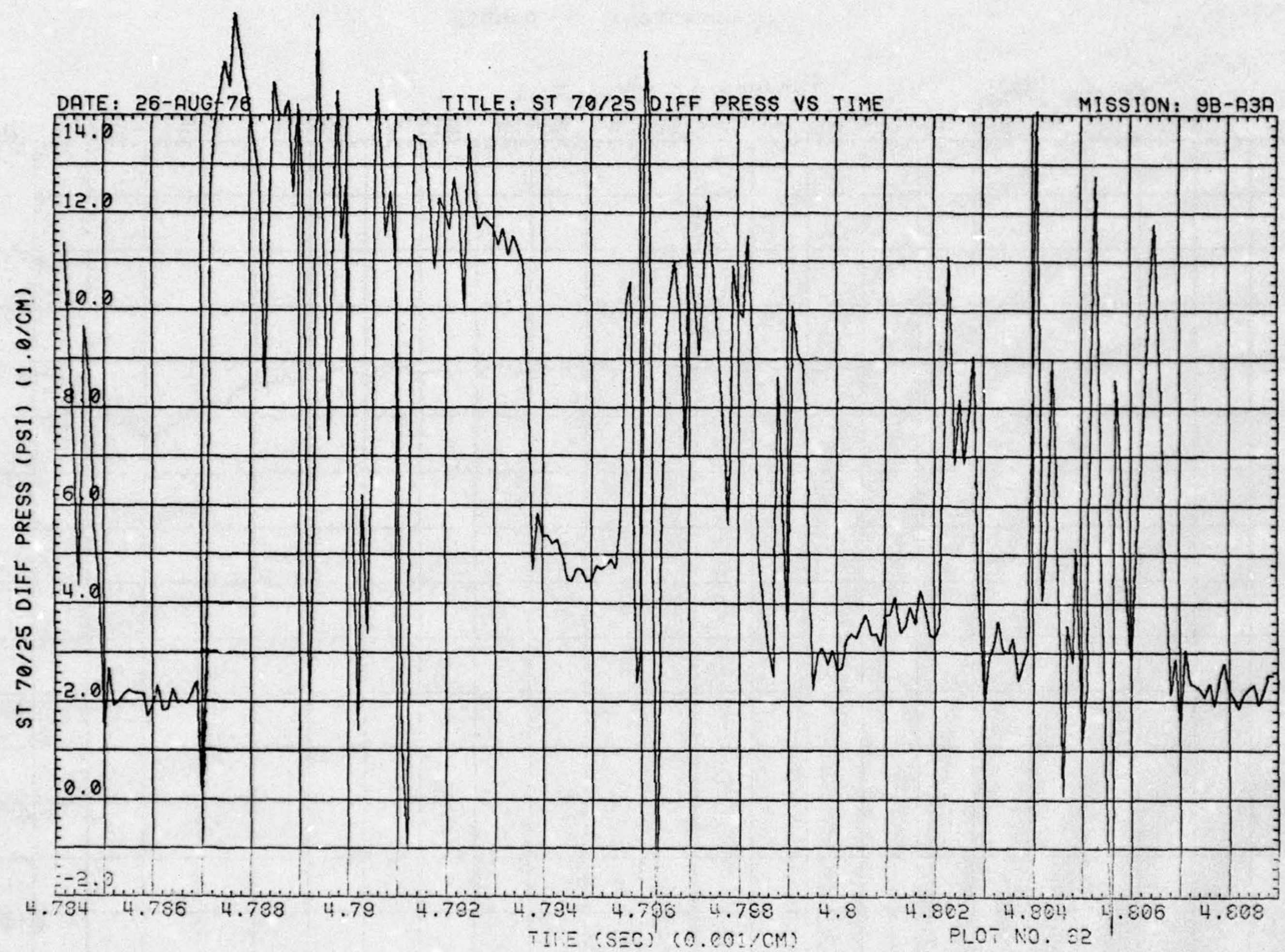


Figure 6. (Continued)

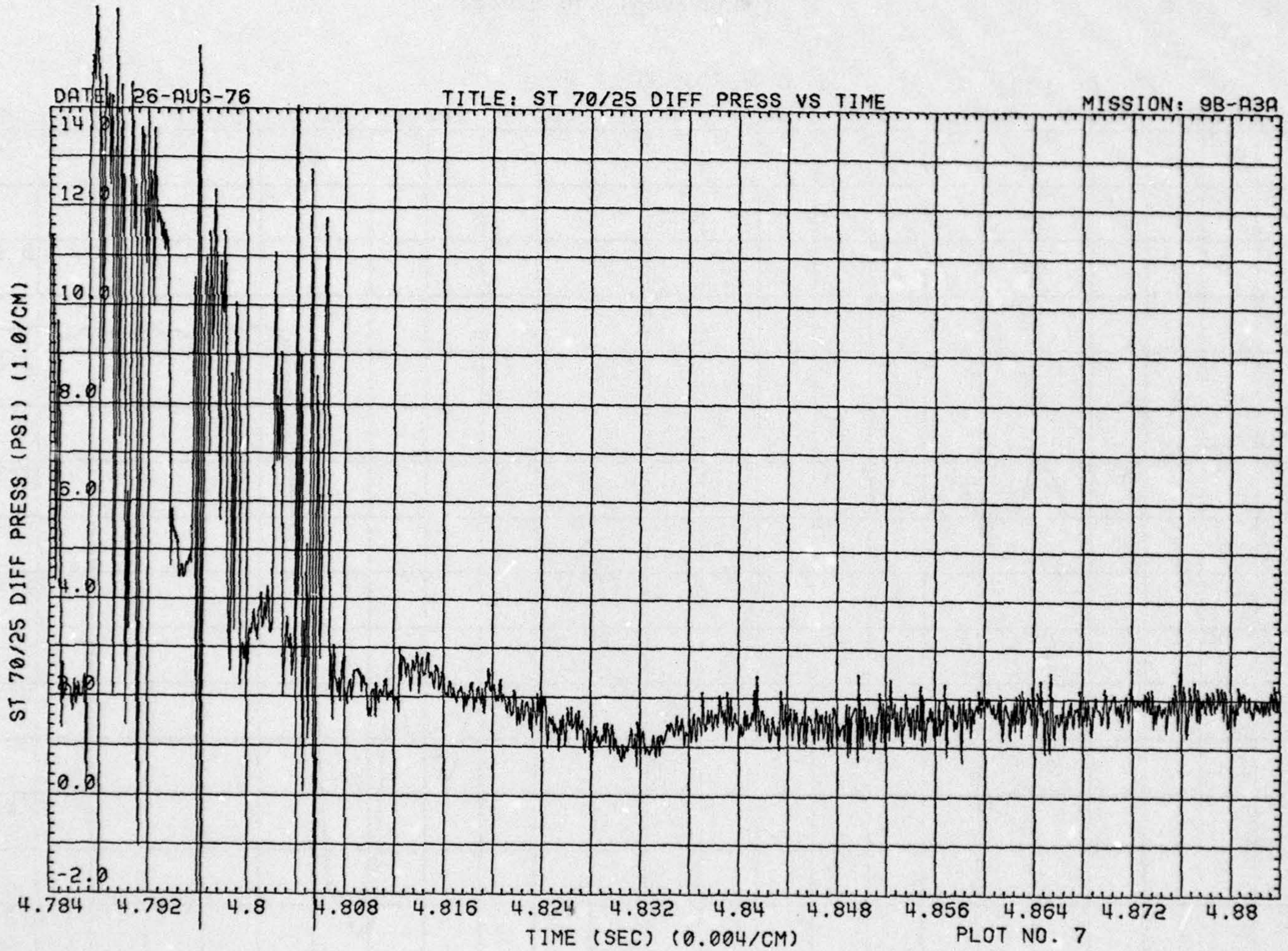


Figure 6. (Continued)

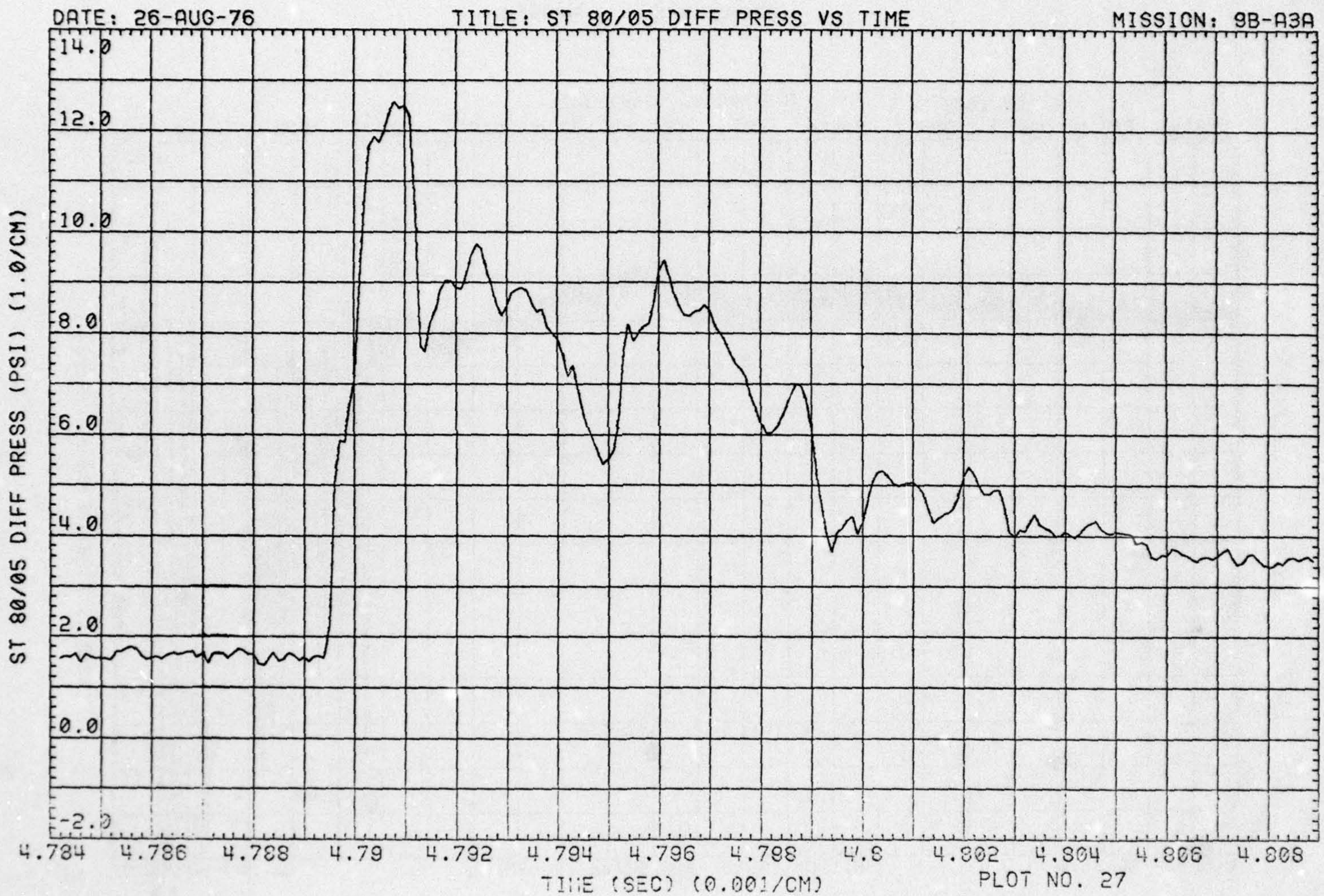


Figure 6. (Continued)

Figure 6. (Continued)

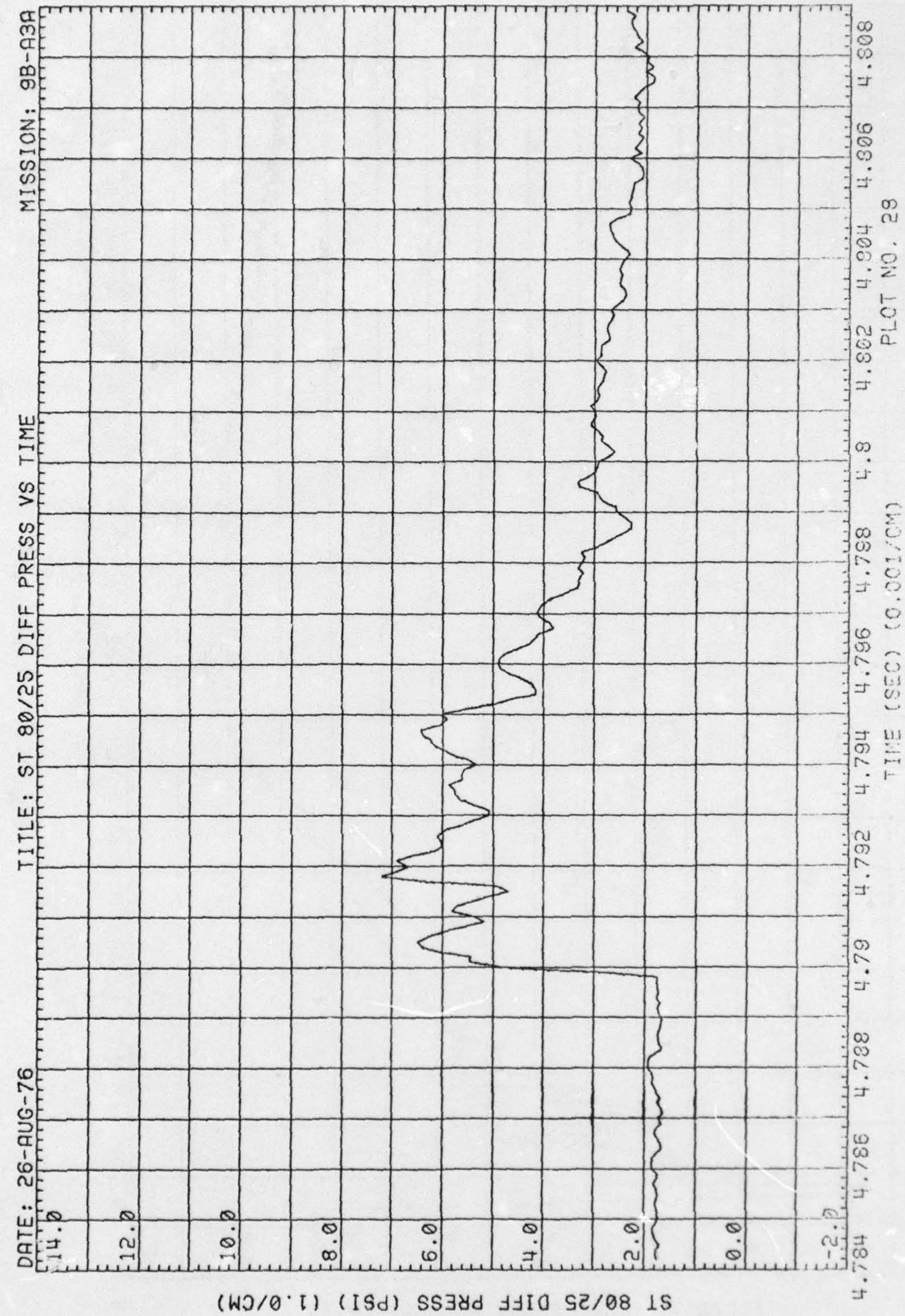


Figure 6. (Continued)

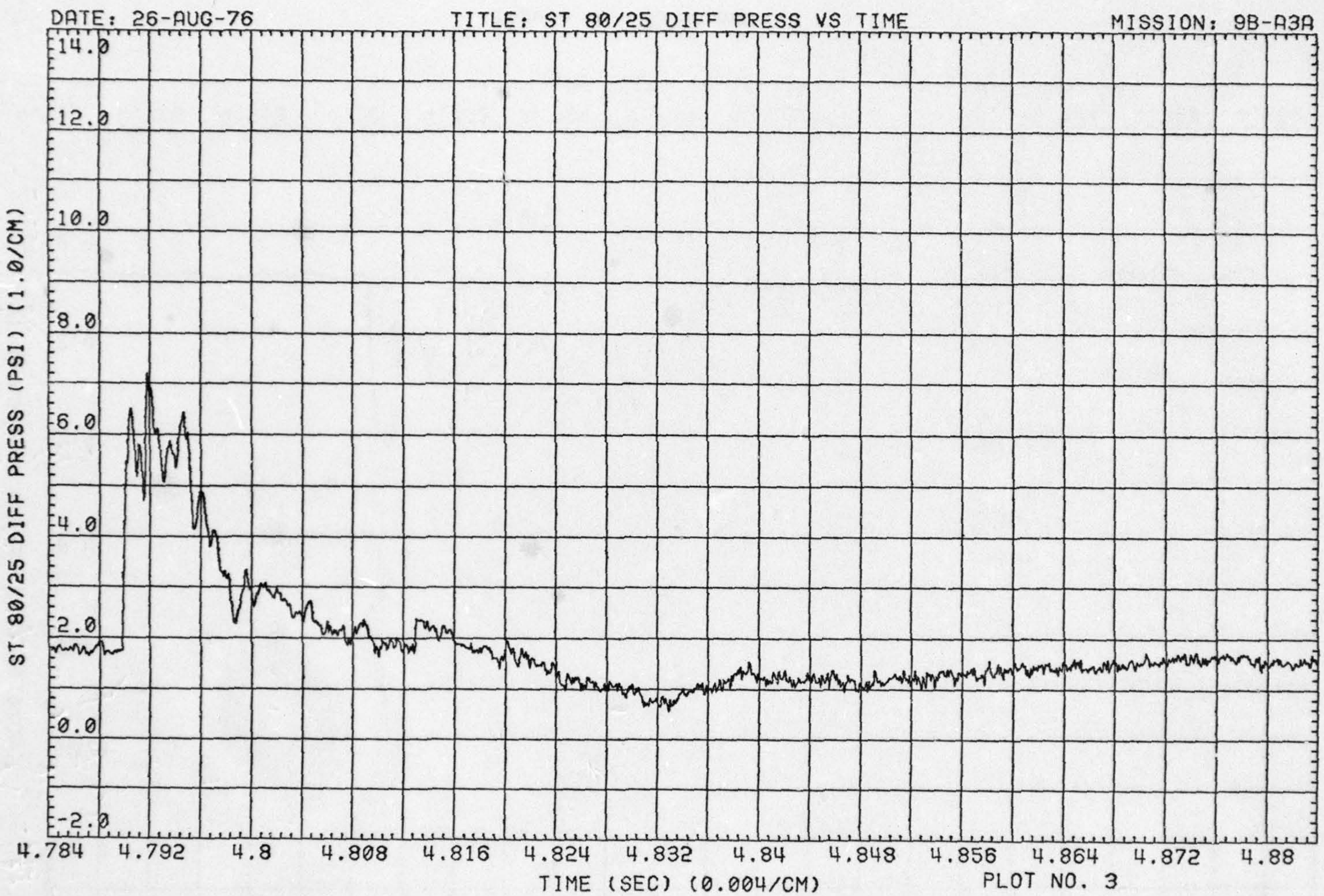


Figure 6. (Continued)

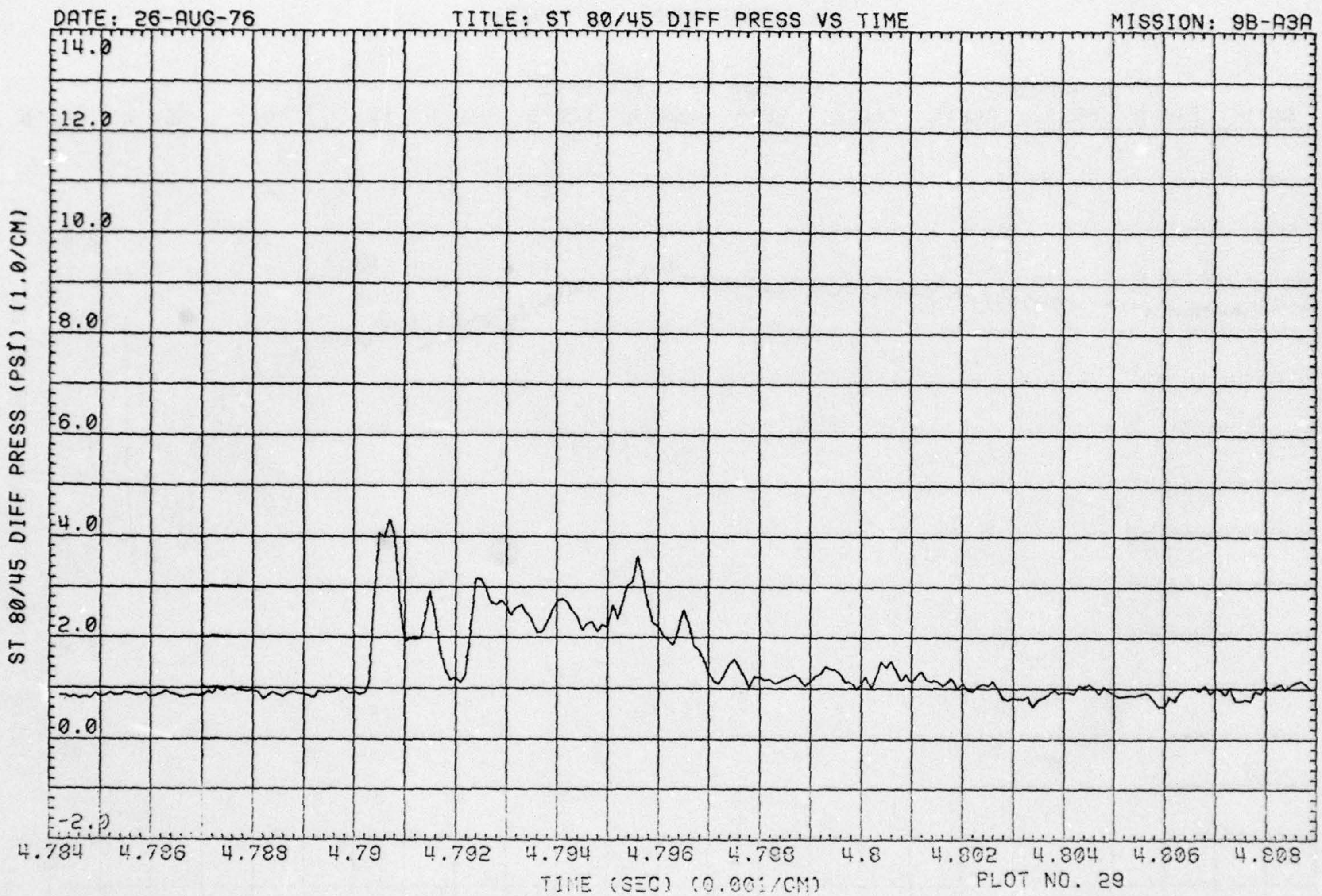


Figure 6. (Continued)

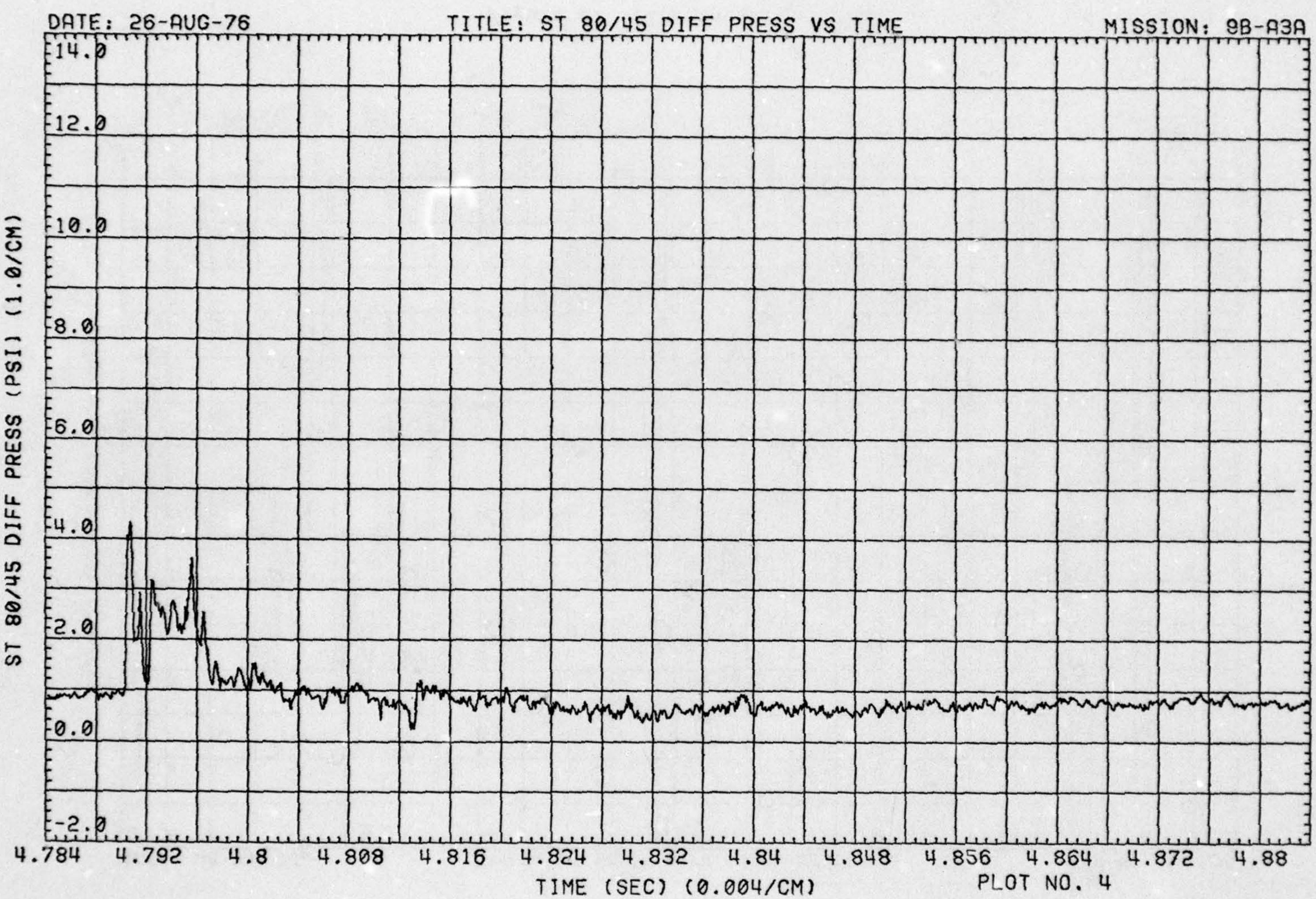


Figure 6. (Continued)

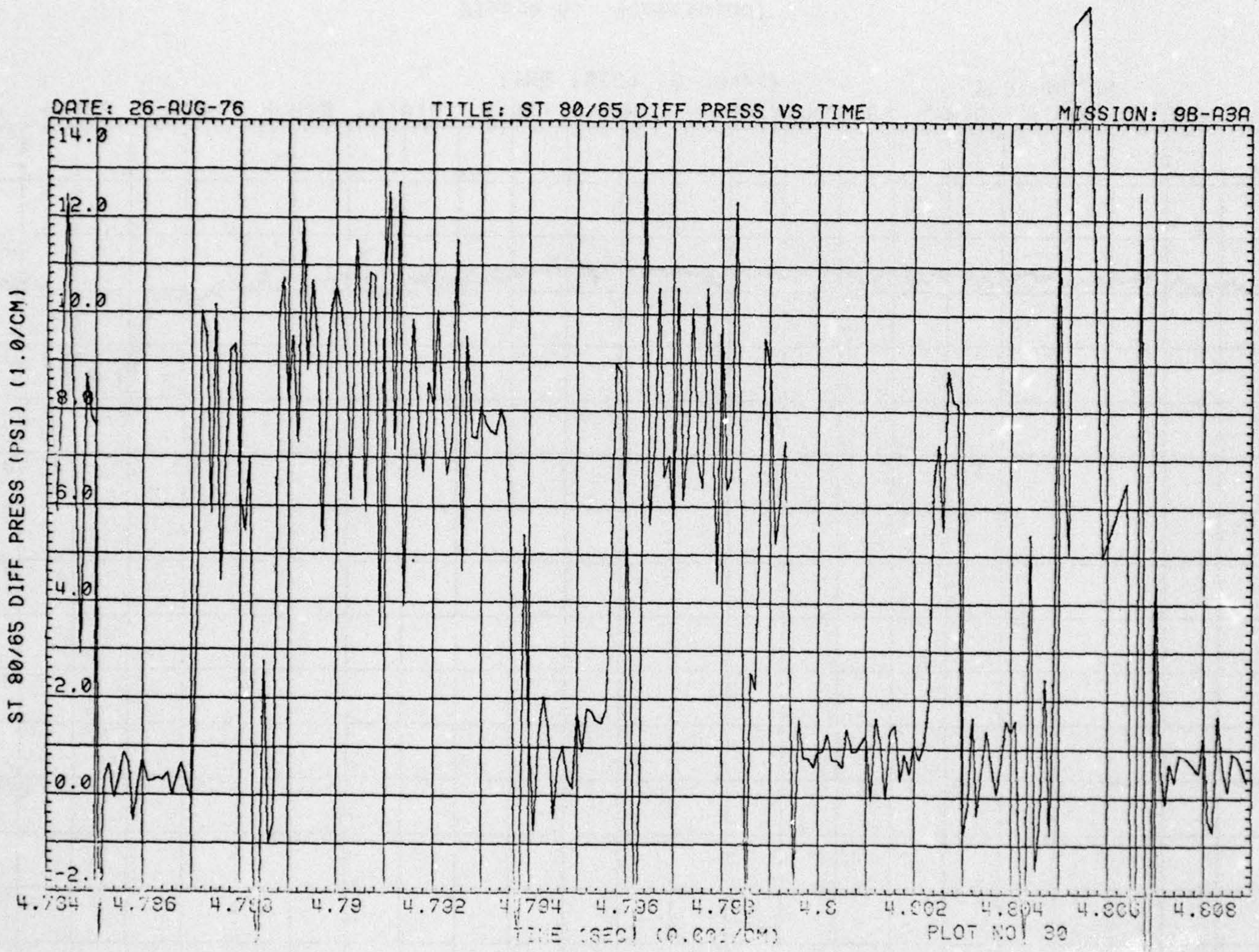


Figure 6. (Continued)

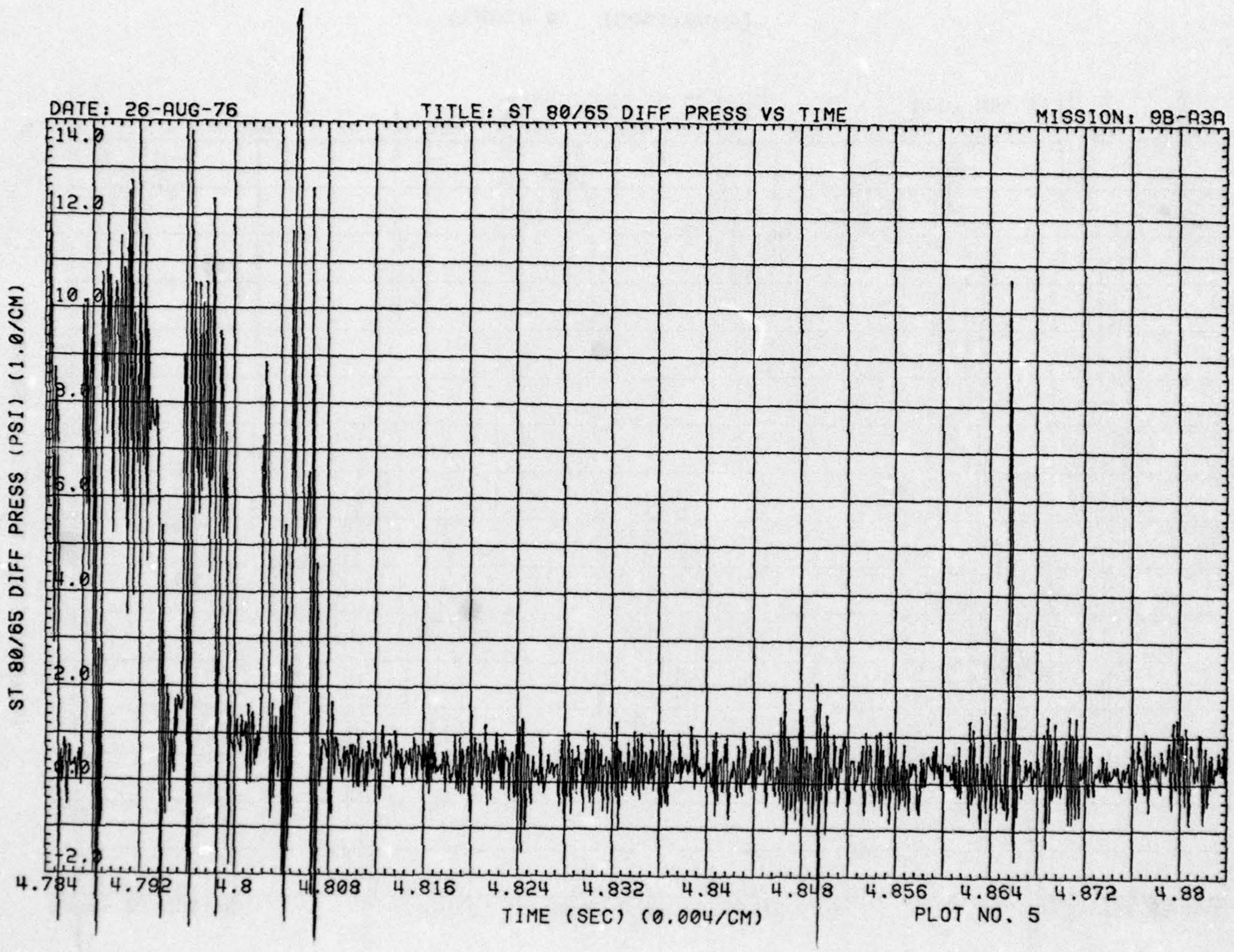


Figure 6. (Continued)

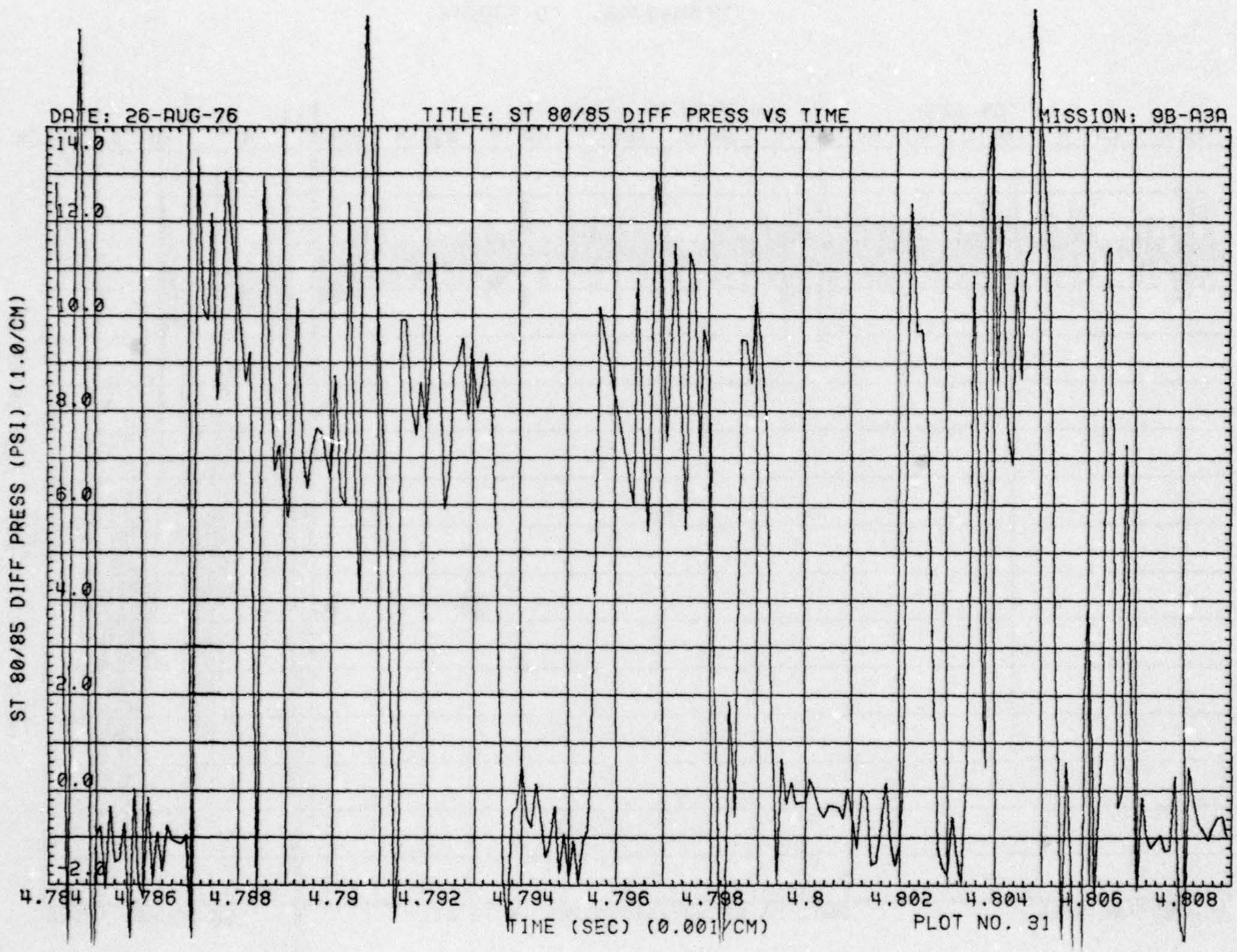


Figure 6. (Continued)

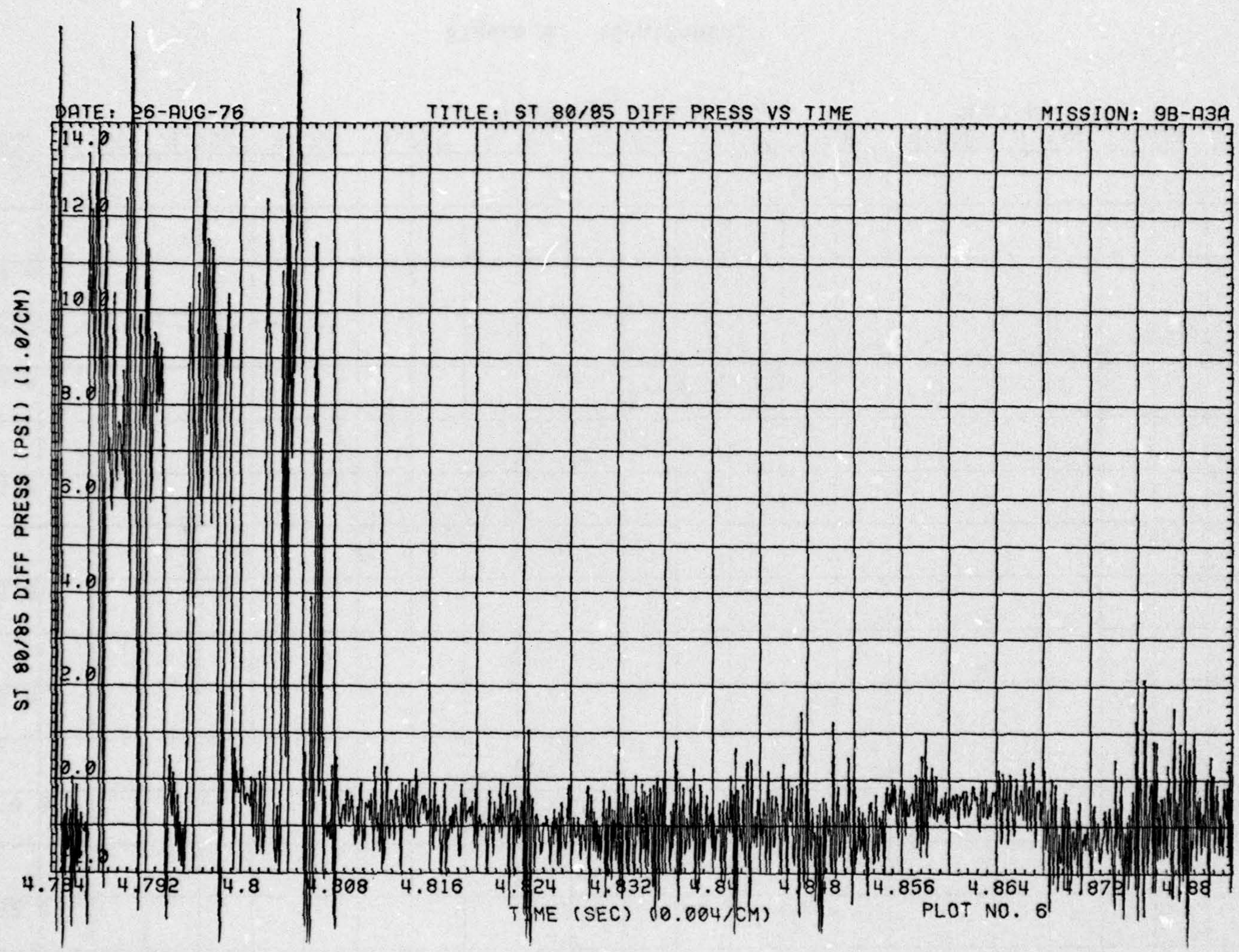


Figure 6. (Continued)

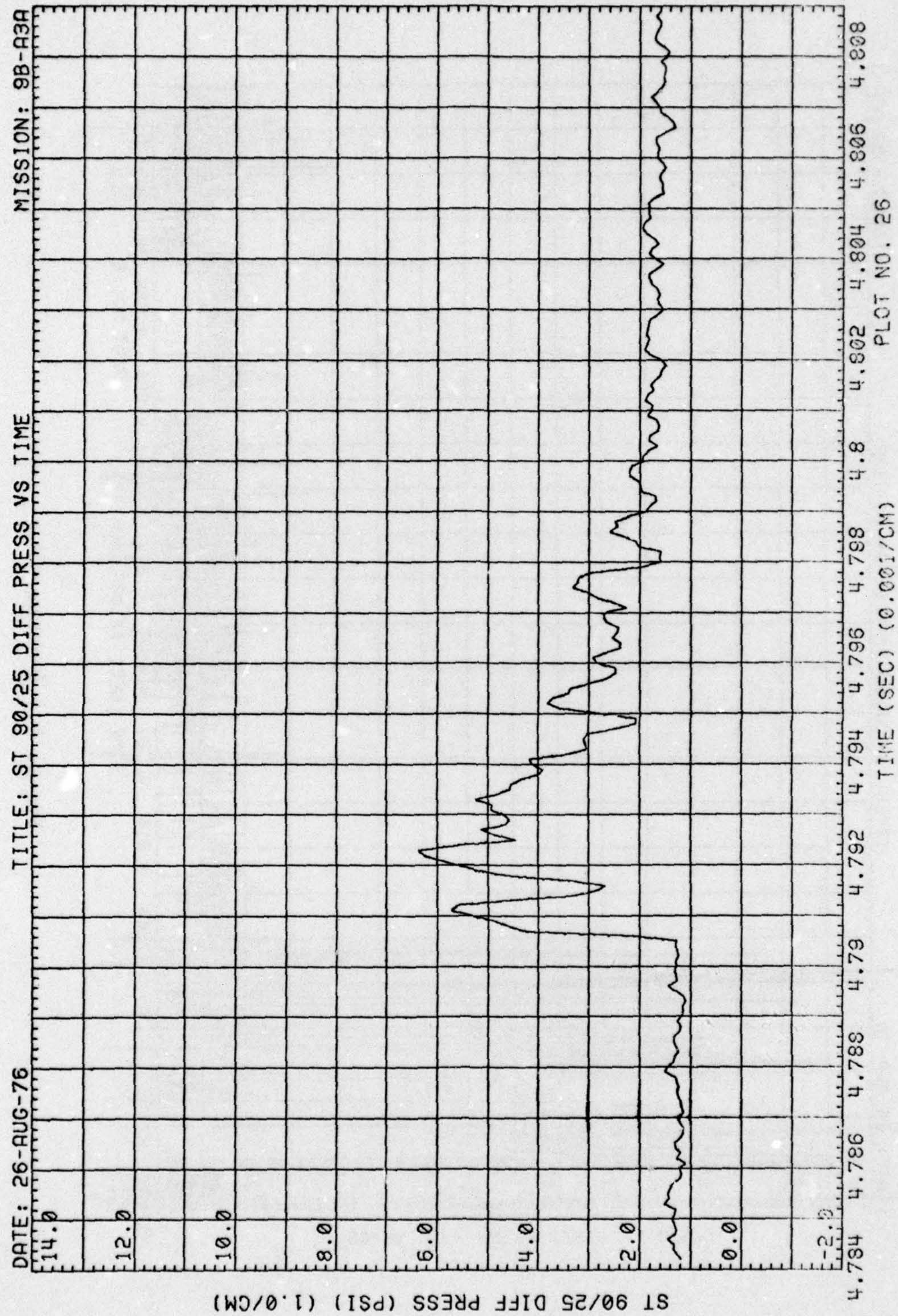


Figure 6. (Continued)

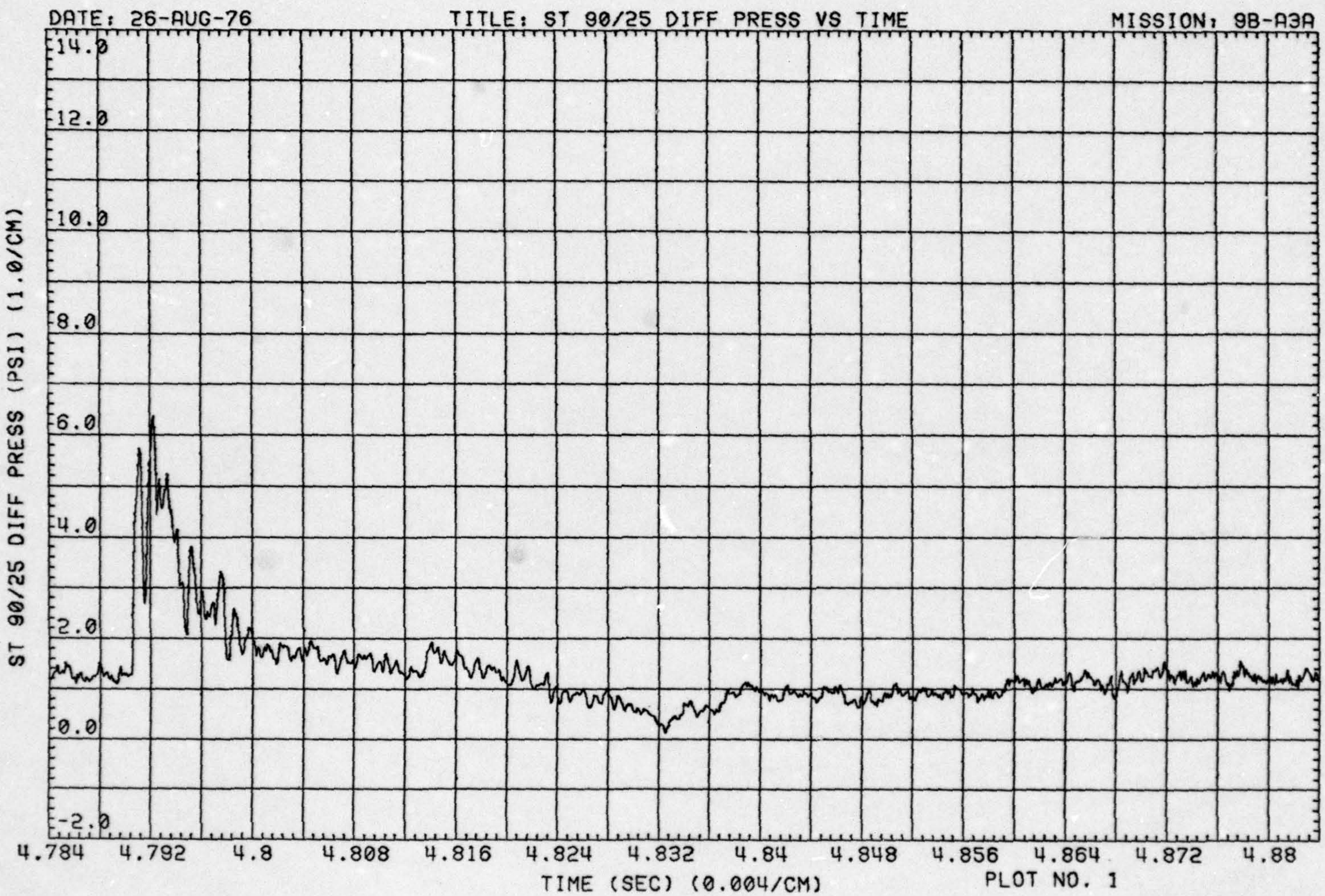


Figure 6. (Continued)

DISTRIBUTION LIST

DEPARTMENT OF DEFENSE

Director
Defense Nuclear Agency
ATTN: TISI Archives
ATTN: STSP
ATTN: DDST
ATTN: SPAS
3 cy ATTN: TITL, Tech. Lib

Under Sec'y of Def. for Rsch. & Engrg.
ATTN: S&SS (OS)

Commander, Field Command
Defense Nuclear Agency
ATTN: FCPR

Chief
Livermore Division, FCDNA
Lawrence Livermore Laboratory
ATTN: FCPRL

Defense Documentation Center
Cameron Station
12 cy ATTN: TC

DEPARTMENT OF THE ARMY

Commander
Harry Diamond Laboratories
ATTN: DRXDO-RBH, James H. Gwaltney
ATTN: DRXDO-NP

Director
U.S. Army Ballistic Research Labs.
ATTN: DRXBR-X, Julius J. Meszaros

Commander
U.S. Army Materiel Dev. & Readiness Cmd.
ATTN: DRCDE-D, Lawrence Flynn

Commander
U.S. Army Nuclear Agency
ATTN: MAJ J. Vecke
ATTN: COL Deverill

DEPARTMENT OF THE NAVY

Chief of Naval Material
ATTN: MAT 0323

Chief of Naval Research
ATTN: Code 464, Thomas P. Quinn

Director
Naval Research Laboratory
ATTN: Code 2600, Tech. Lib

Officer-in-Charge
Naval Surface Weapons Center
ATTN: Ken Caudle

Commanding Officer
Naval Weapons Evaluation Facility
ATTN: Peter Hughes

DEPARTMENT OF THE NAVY (Continued)

Director
Strategic Systems Project Office
ATTN: NSP-272

DEPARTMENT OF THE AIR FORCE

AF Materials Laboratory, AFSC
ATTN: MBC, Donald L. Schmidt
ATTN: MBE

AF Weapons Laboratory, AFSC
ATTN: DYV, Lt Col Rensvold
ATTN: SUL

Commander
ASD
4 cy ATTN: ENFS, D. Ward

Commander
Foreign Technology Division, AFSC
ATTN: PDBF, Mr. Spring

Commander in Chief
Strategic Air Command
ATTN: XPFS

DEPARTMENT OF ENERGY

Sandia Laboratories
ATTN: Doc. Control for D. McCloskey

DEPARTMENT OF DEFENSE CONTRACTORS

Aerospace Corporation
ATTN: W. Barry

Avco Research & Systems Group
ATTN: William Broding
ATTN: J. Patrick

The Boeing Company
ATTN: Robert Dyrdahl
ATTN: Ed York

Boeing Wichita Company
ATTN: D. Pierson
ATTN: R. Syring

Effects Technology, Inc.
ATTN: Richard Parisse

General Dynamics Corp.
ATTN: R. Shemensky

General Electric Company
TEMPO-Center for Advanced Studies
ATTN: DASIAC

Kaman AviDyne
Division of Kaman Sciences Corp.
ATTN: Norman P. Hobbs
ATTN: J. Ray Ruetenik
ATTN: Robert F. Smiley

DEPARTMENT OF DEFENSE CONTRACTORS (Continued)

Kaman Sciences Corporation
ATTN: Donald C. Sachs

Martin Marietta Corporation, Orlando Division
ATTN: Gene Aiello

McDonnell Douglas Corporation
ATTN: J. McGrew

Northrop Corporation
ATTN: Don Hicks

Prototype Development Associates, Inc.
ATTN: John McDonald

DEPARTMENT OF DEFENSE CONTRACTORS (Continued)

R & D Associates
ATTN: Albert L. Latter
ATTN: F. A. Field
ATTN: Jerry Carpenter

Rockwell International Corporation
ATTN: R. Sparling

Science Applications, Inc.
ATTN: Dwane Hove

SRI International
ATTN: George R. Abrahamson